DEFENSE INDUSTRY BULLETIN

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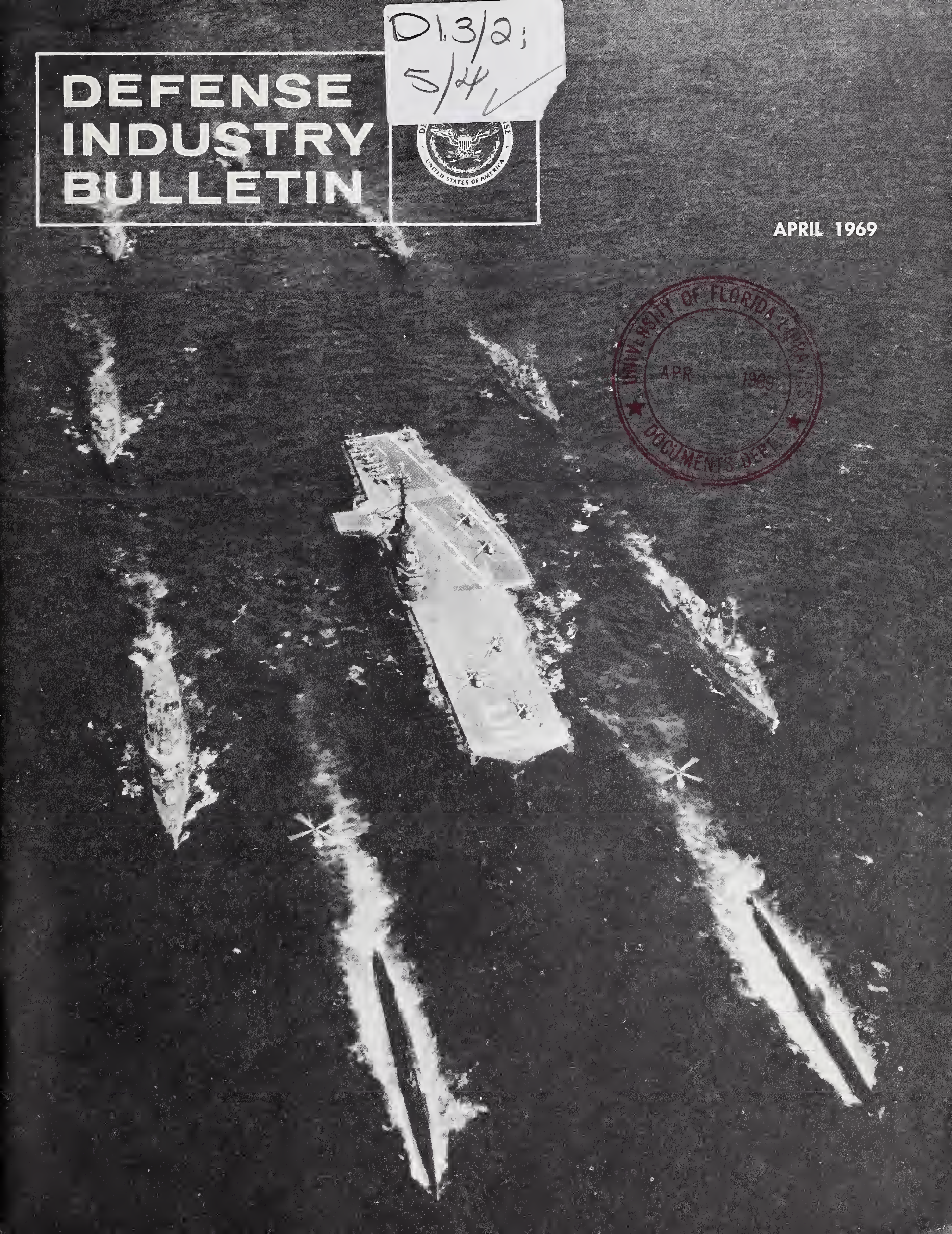

DEFENSE INDUSTRY BULLETIN

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The *Bulletin* serves as a means of communication between the Department of Defense, its authorized agencies, defense contractors and other business interests. It provides guidance to industry concerning official DOD policies, programs and projects and seeks to stimulate thought on the part of the Defense-Industry team in solving problems allied to the defense effort.

Suggestions from industry representatives concerning possible topics for future issues are welcomed and should be forwarded to the Editor at the address shown below.

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End product of support rendered by Naval Material Command is epitomized by the ships and aircraft of Navy Task Force Alpha, featured on the cover. The story of the Naval Material Command begins on page 1.

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The Naval Material Command—A System of Systems

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Admiral I. J. Galantin, USN

The Navy's battle plans for six months or a year hence must be translated into material and facilities. Production of weapons must be scheduled and supervised as a united whole, planes must be on hand when aircraft carriers are commissioned, bases must be ready when men report for training.

With these words, Under Secretary of the Navy James V. Forrestal in 1942 explained to Congress one of his reasons for setting up the Office of Procurement and Material. Twenty-seven years later, in terms more modern but with aims identical, the Naval Material Command, like its World War II ancestor, "translates battle plans into material and facilities."

General Order Five, issued in 1966 by former Secretary of the Navy Paul H. Nitze, contains the command charter: "The Chief of Naval Material, under the Chief of Naval Operations, shall command the Naval Material Command, and shall . . . meet material support needs of the Operating Forces of the Navy for . . . the development, acquisition, construction, maintenance, alteration, repair, and overhaul of ships, aircraft, surface craft, weapons or weapons systems, materials and facilities . . ." This responsibility extends throughout the life cycle of systems and equipment, from conception to disposal; it includes advice and technical guidance not only on the operation and upkeep of systems and equipment already in the Fleet, but also on the practicality of developing and acquiring new ones.

It would be wrong to imply that "material support," an inclusive term that blankets the whole material cycle (for example, it includes shipboard maintenance), is vested solely in the Naval Material Command. The operating commands of the Navy, the shore commands, and the Marine Corps all perform some aspects of material support, but incidental to their main mission. For the Naval Material Command, it *is* the mission.

The organization of the Department of the Navy is by no means simple; it is complicated by its hugeness but even more by the variety of its military functions and by its unique combination of two military services, the Navy and Marine Corps. Even the Washington veteran can lose his way in the official charts. The Chief of Naval Material is an "echelon 2" commander, *i.e.*, a direct subordinate of the Chief of Naval Operations (CNO).

Historical Development

The genealogy of the headquarters element of today's Naval Material Command, formed in 1966, can readily be traced back through the "new" Office of Naval Material (organized in 1963), the "old" Office of Naval Material (1948), the Material Division in the Office of the Secretary of the Navy (1946), the Office of Procurement and Material (1942), and the Material Division in the office of the CNO (1941). Much more ancient is the lineage of the subordinate systems commands, which as bureaus or parts of bureaus go back at least to 1842.

It has long been recognized that coordination among the "hardware" and logistic support elements of the Navy is necessary. Historically, various means have been employed. The Secretary of the Navy himself, with the help of his assistants, has in times past performed this function. The Chief of Naval Operations had certain coordinating responsibilities. In his earlier role, the Chief of Naval Material coordinated Navy bureaus in procurement, production and supply matters, acting in a "staff" capacity at the secretarial level. Finally, the former bureaus under various mechanisms and agreements cooperated with one another in mutual enterprises.

These means were successful to some degree, but the Navy decided that more was needed. In the stress of World War II, a special and powerful wartime agency (the Office

Admiral I. J. Galantin is Chief of Naval Material, Naval Material Command. He has served in various command positions. He was Director of Antisubmarine/Submarine Warfare Division in the Office of Chief of Naval Operations, and Special Projects Officer in the Office of the Secretary of the Navy, before assuming his present position.

of Procurement and Material, mentioned earlier), headed by a vice admiral was formed to supervise some aspects of the Navy's production efforts, and to deal centrally with the War Production Board and like agencies. This wartime office declined after the war, but as the complexity and cost of naval warfare systems burgeoned in post-war years, the need for stronger direction and coordination of material efforts again made itself evident, even in peacetime.

Along with other factors, this growing conviction that a "management gap" existed in the Navy led to a massive study in 1962 at the direction of the Secretary of the Navy. The resulting "Dillon Report" recommended " . . . that the Secretary of the Navy establish under his immediate supervision a Chief of Naval Support to coordinate, control, direct, and command the Chiefs of the Bureaus of Naval Weapons, Ships, Supplies and Accounts, and Yards and Docks."

This the Secretary did, but with one change. Instead of setting up a wholly new Chief of Naval Support, he decided to use the resources at hand. He vested the new command function in the Chief of Naval Material (who would continue to exercise his previous staff functions). Thus in December 1963, the Naval Material Support Establishment (NMSE) was formed, comprising the "old" Office of Naval Material, and the four material bureaus along with their field activities. The NMSE incorporated also the three project management offices that had been established earlier by the Secretary: Special Projects (Polaris), F111B/Phoenix, and Surface Missile Systems (the three Ts—Terrier, Tarter, and Talos).

The latest step in the evolution of the Naval Material Command occurred two and a half years later. In 1966, after careful analysis by the Chief of Naval Operations and the Commandant of the Marine Corps, the Secretary directed two changes in Navy organization. First, NMSE was to be restructured and renamed the Naval Material Command (NMC); second, three supporting commands (Bureau of Naval Personnel, Bureau of Medicine and Surgery, and the new Naval Material Command) were to be placed under the Chief of Naval Operations.

To form NMC, the basic structural change was to convert the four material bureaus into six systems commands. Essentially, the Ship Systems and Electronics Systems Commands now conform to the old Bureau of Ships; the Air Systems and Ordnance Systems Commands conform to the old Bureau of Naval Weapons. The other two systems commands, Supply Systems and Facilities Engineering, correspond closely to their predecessors, the Bureau of Supplies and Accounts and the Bureau of Yards and Docks.

Operating Concepts

The Naval Material Command consists essentially of four elements: headquarters, systems commands, project management offices, and directly-commanded shore activities (see Figure 1). The chart, of course, can show only the visible form of organization and not its essence, the division of responsibilities and the mutual relationships.

The systems commands constitute by far the largest of the four organizational elements. Together, they account for nearly 90 percent of the 300,000 personnel in NMC. The systems commanders are the principal line executives of NMC. They develop, design and procure naval systems and equipment, ranging in size from the carrier Nimitz to the handheld radio. It is they who let most of the contracts, administer most of the appropriated funds, and control most of the supporting shore activities.

Because all the systems command headquarters are located in Washington, most in the same building with the Chief of Naval Material and his staff, the Naval Material Command is sometimes thought to be highly centralized. This proximity is convenient, but misleading; NMC in fact is and must be a decentralized organization, similar in many respects to a large, multi-product corporation. The headquarters corresponds to the "corporate level," the systems commands to operating divisions, and the laboratories and other independent activities to corporate-level supporting functions and common services. Even the project managers have their counterparts in industry, where special groups are formed to fulfill (or pursue) large contracts.

The headquarters of NMC, with about 600 people, is by design quite small. It concentrates on the normal staff functions, serving as an "extension of the commander" by assisting him directly in the overall management of the command: in planning and basic policy making, in organizing, in assigning work and allocating resources, in coordinating where needed, in following progress and evaluating performance. It "gets into operations" only as necessary for central control in such supporting programs as management information systems and research, development, test and evaluation management. Early in 1966, the Chief of Naval Material issued these guidelines for the headquarters staff:

> **We must be aware of problems and give help where needed. We need information, but not in the detail needed by project managers and Systems Commanders. We have to stick to essentials. We are not big enough to get into details. I don't want us to be guilty of holding onto work that belongs to the project managers and the Systems Commanders. We must not usurp their job. But we expect them to keep us posted. Our job is not to do, but to manage.**

By means of "charters" for the systems commands and for the "CNM-designated Project Managers" (those project managers who report directly to Chief of Naval Material), and by amplifying directives in various program areas, the Chief of Naval Material tries to define as clearly as possible the "management packages" to be achieved by each of his line executives. Insofar as possible, these packages are defined in terms of "systems" in the hardware sense. The process, it must be admitted, is inexact. Men of good will often disagree on where a given system begins and ends, and on what is vital to system integrity.

Actually, any system is only part of a larger system which, in turn, is part of a still larger system. A fire control system is part of a weapon system is part of a ship system is part of an air defense system is part of an amphibious warfare system,

NAVAL MATERIAL COMMAND

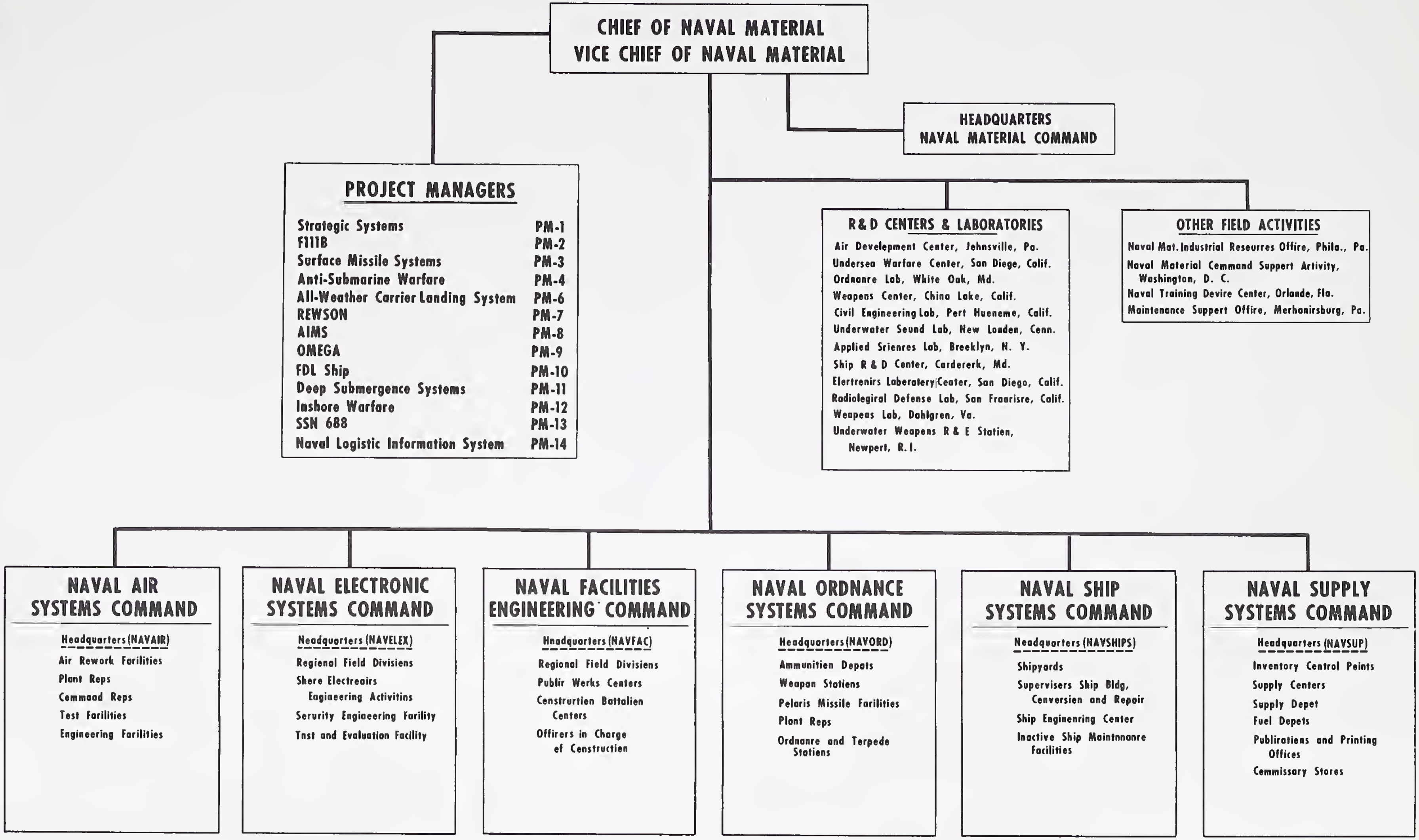

CHIEF OF NAVAL MATERIAL
VICE CHIEF OF NAVAL MATERIAL
HEADQUARTERS NAVAL MATERIAL COMMAND
PROJECT MANAGERS
Strategic Systems PM-1
F111B PM-2
Surface Missile Systems PM-3
Anti-Submarine Warfare PM-4
All-Weather Carrier Landing System PM-6
REWSON PM-7
AIMS PM-8
OMEGA PM-9
FDL Ship PM-10
Deep Submergence Systems PM-11
Inshore Warfare PM-12
SSN 688 PM-13
Naval Logistic Information System PM-14
R & D CENTERS & LABORATORIES
Air Development Center, Johnsville, Pa.
Undersea Warfare Center, San Diego, Calif.
Ordnance Lab, White Oak, Md.
Weapons Center, China Lake, Calif.
Civil Engineering Lab, Port Hueneme, Calif.
Underwater Sound Lab, New London, Conn.
Applied Sciences Lab, Brooklyn, N. Y.
Ship R & D Center, Carderock, Md.
Electronics Laboratory Center, San Diego, Calif.
Radiological Defense Lab, San Francisco, Calif.
Weapons Lab, Dahlgren, Va.
Underwater Weapons R & E Station, Newport, R. I.
OTHER FIELD ACTIVITIES
Naval Mat. Industrial Resources Office, Phila., Pa.
Naval Material Command Support Activity, Washington, D. C.
Naval Training Device Center, Orlando, Fla.
Maintenance Support Office, Mechanicsburg, Pa.
NAVAL AIR SYSTEMS COMMAND
Headquarters (NAVAIR)
Air Rework Facilities
Plant Reps
Command Reps
Test Facilities
Engineering Facilities
NAVAL ELECTRONIC SYSTEMS COMMAND
Headquarters (NAVELEX)
Regional Field Divisions
Shore Electronics Engineering Activities
Security Engineering Facility
Test and Evaluation Facility
NAVAL FACILITIES ENGINEERING COMMAND
Headquarters (NAVFAC)
Regional Field Divisions
Public Works Centers
Construction Battalion Centers
Officers in Charge of Construction
NAVAL ORDNANCE SYSTEMS COMMAND
Headquarters (NAVORD)
Ammunition Depots
Weapon Stations
Polaris Missile Facilities
Plant Reps
Ordnance and Torpedo Stations
NAVAL SHIP SYSTEMS COMMAND
Headquarters (NAVSHIPS)
Shipyards
Supervisors Ship Bldg, Conversion and Repair
Ship Engineering Center
Inactive Ship Maintenance Facilities
NAVAL SUPPLY SYSTEMS COMMAND
Headquarters (NAVSUP)
Inventory Control Points
Supply Centers
Supply Depot
Fuel Depots
Publications and Printing Offices
Commissary Stores

Figure 1.

and so on. Within the Navy, NMC is but one of several commands, many of which are engaged in "material" functions. Within NMC, individual system managers look after individual warfare systems, but they all affect one another. The command must operate as a coherent whole; in effect, it must be a "system of systems."

Another complication in defining clear work packages and clear interfaces is the need for "horizontal" emphases or constraints. If we consider system or project management to be the "vertical" dimension of organization (and it is in NMC), the horizontal dimension includes such disciplines as configuration control and value engineering, which apply equally to all systems and projects. It also includes across-the-board service functions, such as supply support, facility construction, and training devices, which for reasons of efficiency and standardization (and sometimes by direction of higher authority) are centrally managed.

Still another horizontal aspect of NMC organization is the research, exploratory development, and systems development that is performed by the laboratories and centers. These research and development activities, with more than 25,000 personnel, report directly to the Chief of Naval Material. They are oriented toward specific warfare and technology areas. This orientation differs from the "end-product" ship, aircraft, ordnance, and electronics orientation of the systems commands; therefore, the work of a given laboratory often supports the overall systems responsibilties of two or more systems commands. For this and other reasons, the management of NMC laboratories was centralized, about three years ago, under the new position of Director of Laboratory Programs in NMC headquarters.

Much of the inter-systems command coordination has been assigned to the systems commands themselves, rather than to the NMC headquarters staff. The reasons for this are:

- To keep functions at the lowest feasible level and, thus, restrain the upward migration (and consequent ballooning of headquarters) that so often occurs in large organizations.
- To promote an atmosphere of mutual awareness and cooperation among NMC components so that only the most serious systems problems require the attention of the Chief of Naval Material and his staff.

In line with this policy, the Naval Ship Systems Command exercises "ship life-cycle management" coordination responsibilty, in which the many shipboard systems are blended into an effective whole, both in their original design and in their acquisition and operational support. For aircraft, the Naval Air Systems Command performs a similar function; and for multi-platform electronic systems, it is the Naval Electronic Systems Command.

In addition to these special coordination assignments, the planning disciplines that are required of systems managers also work to improve cohesion of effort, both within NMC and between it and other commands. The manager develops several component plans, which collectively form overall systems management plans, for technical development, funding, procurement, and integrated logistic support. The integrated logistic support plan comprises several subplans—for provisioning and supply support, for facility support, for personnel and training support, for

SYSTEMS COMMANDS OF THE NAVAL MATERIAL COMMAND

MAJOR PROGRAMS AND FUNCTIONS

NAVAL SHIP SYSTEMS COMMAND	NAVAL AIR SYSTEMS COMMAND	NAVAL ORDNANCE SYSTEMS COMMAND	NAVAL ELECTRONIC SYSTEMS COMMAND	NAVAL FACILITIES ENGINEERING COMMAND	NAVAL SUPPLY SYSTEMS COMMAND
● SHIPS & CRAFT: ACQUISITION, CONVERSION, MODERNIZATION, OVERHAUL ● SHIP SYSTEM INTEGRATION & LIFE-CYCLE MGMT ● SHIP EQUIPMENT: HULL, MACHINERY, ELECTRICAL, OTHERS ● SALVAGE & DIVING ● SONARS & SURVEILLANCE RADARS ● INACTIVE (RESERVE FLEET) SHIP MANAGEMENT	● AIRCRAFT: ACQUISITION, MODERNIZATION, OVERHAUL ● AIRCRAFT EQUIPT. ● AIRCRAFT SYSTEM INTEGRATION ● AIR LAUNCHED WEAPONS & EXPENDABLES ● SHIPBOARD CATAPULTES, ARRESTING GEAR, VISUAL LANDING AIDS ● PHOTOGRAPHIC EQUIPT. & TECHNOLOGY ● METEOROLOGIC EQUIPT. & TECHNOLOGY	● SHIPBOARD WEAPON SYSTEMS: ACQUISITION, MODERNIZATION, OVERHAUL ● ORDNANCE SYSTEM INTEGRATION ● MINES, TORPEDOES, GUN AMMUNITION, SHIP LAUNCHED MISSILES: ACQUISITION, STORAGE, LOADING, ASSEMBLY, ETC. ● EXPLOSIVES: TECHNOLOGY, SAFETY, DISPOSAL ● SMALL ARMS, SWIMMER WEAPONS, DEMOLITION CHARGES, ETC.	● COMMUNICATIONS SYSTEMS: SHIP, SHORE, SATELLITE ● FIXED SURVEILLANCE SYSTEMS ● NAVIGATION AIDS, AIR TRAFFIC CONTROL EQUIPT. ● COMMAND CONTROL SYSTEMS ● GENERAL TEST & TELEMETRY EQUIPMENT ● ELECTRONIC WARFARE EQUIPMENT: SHIP, SHORE ● ELECTRONIC TECHNOLOGY, COMPATIBILITY, ETC.	● MILITARY CONSTRUCTION ● REAL PROPERTY ACQUISITION, DISPOSAL, INVENTORY MGMT. ● NAVY HOUSING MANAGEMENT ● FACILITY PLANNING, & PROGRAMMING ● FACILITY MAINTENANCE GUIDANCE ● NUCLEAR SHORE POWER ● AUTOMOTIVE, RAILWAY, CONSTRUCTION, WEIGHT-HANDLING, EQUIPMENT ● NATURAL RESOURCES ● POLLUTION CONTROL ● NAVY SEABEE SUPPORT	● SUPPLY MGMT. ● PRINTING & PUBLICATIONS ● EXCHANGES, COMMISSARIES, SHIP STORES, FOOD SERVICE ● FIELD PURCHASING MANAGEMENT ● TRANSPORTATION MANAGEMENT ● MOVEMENT OF HOUSEHOLD GOODS ● MATERIAL HANDLING, FOOD SERVICE EQUIPMENT ● NAVY STOCK FUND MGMT.

Figure 2.

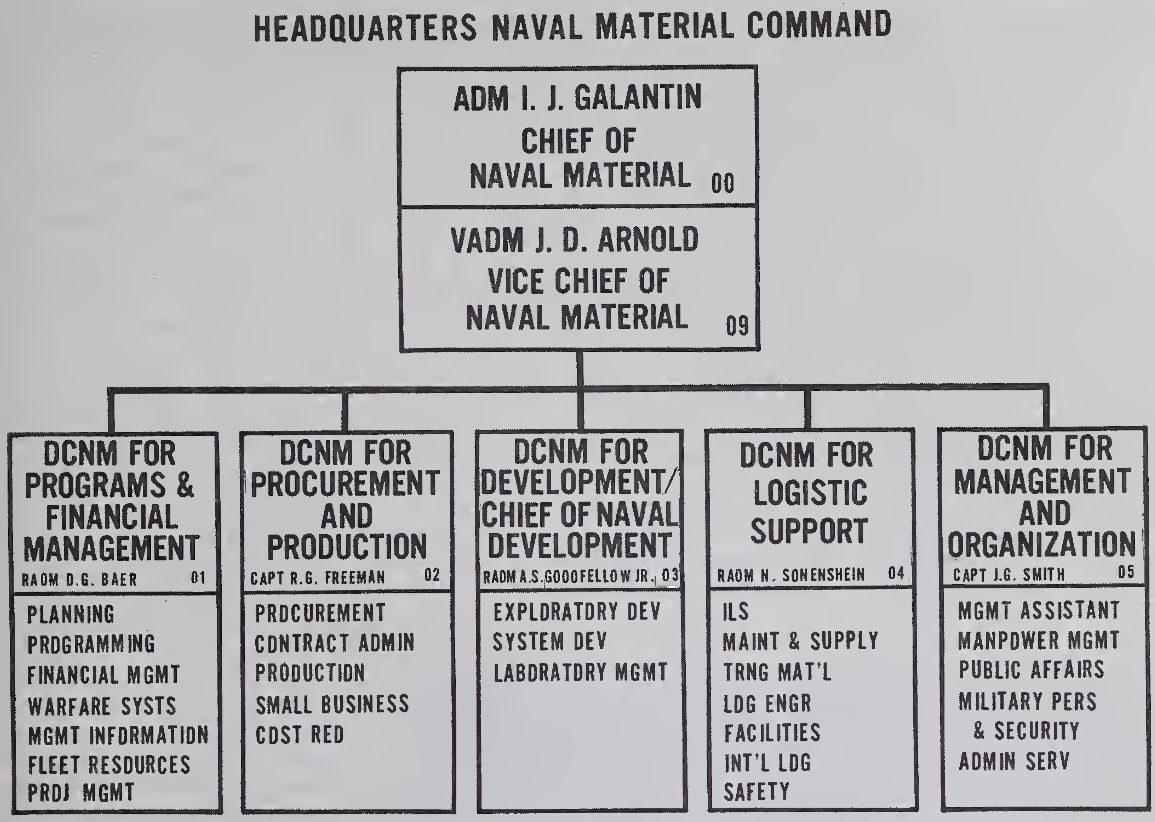


Figure 3.

installation in operating units, etc. An important duty of the NMC headquarters staff (and one not calculated to win popularity awards) is the policing of these planning disciplines— trying to see that they are done right and done at the right time.

Major Programs—Size and Scope

The programs carried on by NMC are notable not only for their size but also for their variety, which reflects the variety and scope of the Navy-Marine Corps missions in national defense. Undersea, surface, carrier strike, strategic missile, amphibious, electromagnetic, inshore and riverine and land, antisubmarine and anti-air—all these warfare capabilities are supported by systems and equipment, and by logistic and industrial operations ashore.

The annual NMC procurement programs now approximate $10 billion, in a total NMC budget of about $13.5 billion. The 300,000 NMC personnel, about 8 percent military and 92 percent civilian, are located in about 320 field and headquarters activities, more than 95 percent outside of Washington. The largest single user of NMC manpower is the shipyard complex, with about 100,000 personnel.

Because the operations of each of the six Naval systems commands will later be described in the *Bulletin*, only a brief summary is provided here (see Figure 2). For brevity, many of the lesser programs are not shown. A good description of the Naval systems commands, as well as that of other DOD agencies, can be found in the "U. S. Government Organization Manual," updated annually and available from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, for $2.

Management Concepts and Trends

Much of the 600-man staff at Headquarters, Naval Material Command, devotes its attention to broad command policy and procedures —ground rules for the operation of the entire command. These matters often impact directly on Navy contractors and brief mention of some of them follows.

The concepts and trends that are emerging in Navy management of development, acquisition, and logistic support do not all originate in one place, of course, nor do they burst full-blown on the management scene. Ordinarily they evolve gradually, based on experience (good or bad)— often with the helpful advice of industry. Sometimes new laws, or evidence of Congressional interest, speeds their evolution. The Office of the Secretary of Defense, as well as the Secretary of the Navy, encourage and sometimes prescribe new methods and policies.

Of the five deputies on the Chief of Naval Material's staff (see Figure 3), the one most involved in matters of direct concern to industry is probably the Deputy Chief of Naval Material (Procurement and Production). His directorate (MAT–02) serves a dual purpose. It assists the Assistant Secretary of the Navy (Installation & Logistics) in the policy areas of procurement, contract administration, contract costs, contractor performance evaluation, and the like, for application to the Department of the Navy as a whole. At the same time, MAT–02 broadly supervises the procurement/contracting function, and the related functions of production reporting and management control systems, within NMC.

At the Chief of Naval Material management information center recently, the Deputy for Procurement and Production outlined his goals for the forthcoming year. Without neglecting the continuing efforts such as cost reduction, small business, and labor relations, he plans to work in particular for improvement in several broad areas.

One such area is selecting the proper form of contract for a given acquisition. Each acquisition has its own character, its own risks. The contractual instrument must correspond to this character and these risks. The fixed-price contract, for example, may not be the best instrument if an acquisition entails significant development effort. More skill and more judgment must be applied in the choice of contracting method. To this end, procurement personnel now play a more active role in the earlier stages of system development, working side by side with engineers and logisticians.

Another challenge to be met is to improve the procedures by which items developed by Navy laboratories are transferred to industry for production. A successful prototype at the laboratory does not necessarily assure a successful production model. Where the contractor has assisted the laboratory during development, the Navy may support initial volume production by that contractor, in which case the Navy will try to ensure that this contractor produces a usable data package, to allow reprocurement from another production source with no more than reasonable engineering effort by the second source.

Carrier USS Ranger (CVA-61) shown launching A-7 Corsair aircraft on attack mission.

As to competition, the Navy wants competitive bids whenever it is practical and reasonable to seek competition. There is no useful purpose, however, in encouraging a number of companies to prepare proposals if it is known that only one source can do the job. If competition is impractical, the fact must be recognized and both industry and the Navy spared the time and expense of competitive bids.

Finally, contract administration deserves special attention. Some of the toughest procurement problems surface after the contract is awarded and work begun. These problems must be resolved promptly and intelligently. Contract administration is a demanding business, and it warrants capable, experienced Navy personnel in our contractors' plants. Headquarters, Naval Material Command, will emphasize this need, and work with the systems command and the Defense Contract Administration Service to improve their contract administration networks and to streamline their operations.

Logistic Disciplines

One of the most difficult challenges in major system management is to help keep them "on the line" after they are in the hands of the Fleet. NMC constantly works to improve, both afloat and ashore, the day-to-day management of maintenance and supply—the most visible aspects of logistic support. Much has been achieved to aid the 20-year-old sailor in maintaining his piece of equipment through better allowance lists of spare parts, better guidance and training on "how to fix it," and quicker action on his requisitions.

The Deputy Chief of Naval Material (Logistics Support) heads up the "logistic family" in the NMC. His directorate (MAT-04) polices and spurs improvement in supply and maintenance operations for material already in the Fleet. Recognizing, however, that steps to attack one of the root causes of today's logistic problems, *i.e.*, the growing complexity and variety of systems, equipments, and components, must be pursued along with attacks on today's problems, the MAT-04 group guides and prods the systems commands in several "logistic disciplines." These disciplines or special programs share one basic objective: to reduce the eventual supply and maintenance burden of Navy forces.

Though some of these disciplines get extraordinarily complex in their planning and execution, they are relatively simple to describe in terms of their objectives. Several examples are presented here, chosen for their immediate interest to Navy contractors.

Standardization, and the closely-related program of "item entry control," are aimed at making our ships, airplanes, and major systems "look more alike," not just in silhouette but in detail—down to feed pumps, electrical fittings, and life jackets. An analysis two years ago showed that, of the 180,000 or so different hull, mechanical, and electrical equipments installed in 900 active ships, 57,000 were installed in *only one ship*, and many others in only two or three ships. It is easy to imagine the logistic complexity that results from this, the proliferation of spare parts, technical data, maintenance instructions, and training requirements.

Progress is painfully slow. The present inventory must be "worked down" through new construction and alteration; we cannot just heave overboard the non-standard items. Discipline at the source is the only practical approach. Among the steps being encouraged are specifications requiring identicality in multi-year procurements, standardization incentive clauses in contracts, and standard component lists.

Coupled with these individual steps is an extensive configuration management program. A three-phase process, configuration management requires, first, that the "baseline" or standard configuration be identified and documented in specific functional and engineering terms; second, that any proposed changes to this baseline be rigidly evaluated for worth versus cost (not just immediate cost but life-cycle cost as well), and that change decisions be approved at a level high enough in the organization to restrain the engineer's tinkering syndrome; and, finally, that approved changes be reflected promptly in a "product" baseline and in maintenance directives, spare parts allowances, etc.

Still other methods of "discipline at the source" are being pursued: Zero Defects, a program to encourage quality in manufacture ("do it right the first time"); and maintenance feedback, by means of automated information systems (the 3–Ms), which alert the design engineers and logistic planners, both Navy and contractor, to maintenance problems in present systems so that they may "do better next time." Increased emphasis is being given to test and demonstration to assure the meeting of quality, reliability, and maintainability requirements in contracts. Other special efforts could be cited—value engineering, for example, and specification improvement—all aimed in part at improving the original product in order to lessen future support problems.

In other ways, contractors more and more will find themselves concerned with follow-on support of systems and equipment. Life-cycle cost considerations enter into increasing numbers of management decisions, especially in systems undergoing concept formulation and contract definition. The integrated logistic support (ILS) discipline injects support considerations, such as provisioning, technical manuals, and training needs, into the early design and acquisition stages. Contractors will be expected to deliver systems that the Navy—and the 20-year-old sailor—can live with.

Development Planning

Another trend in Navy system management is the increasing involvement of research and development centers and laboratories in the advanced stages of system development. In the overall effort to broaden the "life-cycle" awareness of laboratories, these activities are receiving assignments for system analysis, system engineering and integration, and related efforts such as technical direction of acquisition contracts. Overall system acquisition and support responsibility remains, of course, in the systems commands, but the laboratories are becoming active participants. This shift of emphasis is only relative; laboratories are still heavily engaged in the more basic areas of research and technology.

The Deputy Chief of Naval Material for Development (MAT 03) seeks in several ways to improve communications between the Navy research and development community and industry. Plans are underway to establish, in headquarters, the NARDIC (Naval Research and Development Information Center). Its purpose is to provide a clearinghouse for information to industry on the Navy's research and development plans and problems, in the hope of obtaining more timely and better input from industry in solving the problems and carrying out the plans. Three publications are available now, upon request (write to Headquarters, Naval Material Command, Washington D.C. 20360): "Navy and Marine Corps R&D Problems," "Naval Research Requirements," and "Naval Research Opportunities." To be added as NARDIC becomes fully operational are basic "requirements" documents (General Operational Requirements, Specific Operational Requirements, Advanced Development Objectives) and certain progress reports.

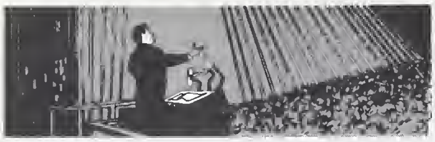
The Deputy for Development, in support of an overall DOD effort, provides "research development, test and evaluation program input" for Advanced Planning Briefings for Industry (APBI). These briefings, sponsored jointly by various industry and DOD organizations, occur about four times a year. They are designed to inform industry on the long-range outlook on required military postures, and on technological advances needed to support future needs. More than 700 industry technical representatives attended the latest APBI, held at Coronado, Calif., in January. The theme of the meeting was "Amphibious, Inshore, and Special Warfare." It was sponsored by the Electronic Industries Association, the National Security Industrial Association, and the Navy. Announcements on APBI appear in the *Defense Industry Bulletin* as well as trade and association journals.

The Defense Management Environment

This discussion of the Naval Material Command—its work, its evolution, its structure, its programs, and some of its concepts—can only touch on the total affairs of the command. In subsequent issues, the systems command will tell their individual stories, in more detail no doubt.

A word in closing on the unusual management environment that has prevailed for the past several years might be in order. The Naval Material Command, like the rest of the Defense Department, operates in the "twilight zone"—half war, half peace. On the one hand, the demands of

(*Continued on inside back cover*)



FROM THE SPEAKERS ROSTRUM

Quality Control Is Known in Its Absence

Address by RAdm. A. R. Gralla, USN, Commander, Naval Ordnance Systems Command, at the 12th Annual American Society for Quality Control and California State Polytechnic College Quality Control Conference, Pomona, Calif., Jan. 25, 1969.

Quality is known by the company it keeps, or more properly, "A company is known by the quality it keeps."

To discuss quality control, I'd like to give my thoughts on quality control as I see it through the eyes of a major producer and purchaser of military equipment, and to break the subject down into its elements—quality and the control of quality, with special emphasis on the military aspects of both.

Because I am an engineer, like most of you here, I wanted to be sure of my terms before going into any discussions. Unfortunately, I found that definitions in the dictionary leave something to be desired, even in unabridged versions.

Quality denotes (in our sense) a degree of excellence, a measure of aristocracy—in brief, something over and above the ordinary.

Control (in our sense) must mean our ability to provide over a complete range of conditions a "repeatability" of product quality, of the highest order and, naturally, at a reasonable price. (Note I said reasonable price and not lowest price, because all too often high quality and low cost do not go hand in hand, and quality is sacrificed to cost.)

It is an anomaly, but quality control is more apparent in its absence, rather than in its presence. This arises because quality control is associated with production, the assumption being that the research and development phase has evolved a fully producible design, and repeatability of that design is then the problem of the quality control organization.

The woods are full of examples of poor quality control, and while the failure of quality control becomes catastrophic, success receives a mere shrug of the shoulder. Let me expand a bit on what occurs. Blamed on poor quality control (rightly or wrongly), and after a proper design has been demonstrated, are the following sins of omission, manifested as additional production costs and the loss of profits:

- Low reliability and, hence, high failure rate in service.
- Difficulty of repeatability or producibility.
- Delays in volume production.
- Difficulty in fluid maintenance, upkeep and adjustment.
- High cost in production and throughout the life cycle of the system.
- Lack of confidence in the system and the people who produced it (tarnished reputation), and a subsequent failure to obtain further contracts (attributed to the corporate memory of the customer).

What Are the Causes? Where Do We Attack it?

Quality must be bred into horses, and used to be considered an attribute of good breeding in men. Since most of our hardware is the product of men's minds and not by transmittal of their genes, the breeding process must give way to the computer and the drafting board. Actually, quality must be designed into a piece of hardware if it is ever to be achieved.

RAdm. A. R. Gralla, USN

There is a relationship to the Zero Defects Program, although I have found that Zero Defects is commonly, falsely equated with quality control. I prefer to think of the Zero Defects Program as only a subsidiary part of the overall quality control task, and related to personal attention given to the "reproducibility" of the production process.

Again resorting to definitions, I find that the Zero Defects Program is defined as:

> **A motivational approach to the elimination of defects attributable to human error—a voluntary program aimed at improving the quality and reducing the cost of producing and maintaining defense material—an organized effort to inspire personnel at all levels in an organization to do their job right the first time, every time.**

In military planning we test an operations plan for logistic feasibility. How many of your companies call you in to check their design for quality "controlability?" I should like to see quality control started before the fact and not after.

Organization for Quality Control

The quality control function must be objective. Like the "inspector," it must be responsive to top management—the eyes, ears and nose of the corporate top level management. Too often I have found quality control submerged in production, tied by an umbilical to engineering, a camp follower of the research and development organization, a partner of value engineering, or just a plain "Little Orphan Annie" of the corporate house.

So without "preaching to the choir" in this audience of quality control engineers, I would like to advocate a position of quality control as a separate department—such as I have done in our own ordnance production facilities. However, please remember that my task here today is to relate you and to you, the impact of quality control. Thus in my remarks I have only the "why," while to you remains the "how" of the problem. Hopefully, today's meeting will make that the easier to attain.

Profits vs Penalties

Until now I have alluded to the penalties of poor quality control; now let us get on to the positive side of the coin.

Doing it right the first time is related to preparation in engineering, design and production to assure the repeatability of the process or product. There must be the assurance that each article is exactly like its predecessor. This assurance comes with testing (and its partner, metrology), in all environments and conditions.

For example, one of our torpedoes had a nose problem. We were unable to duplicate a nose after we had designed and manufactured a good one. There were many reasons for the impasse—poor documentation, poor process control (application of epoxy, determining the proper number of holes in the good retaining ring)—in short, poor quality control.

An example involving another torpedo was its failure to pass in-water tests after having satisfactorily passed the prescribed factory tests. Here, poorly designed testing procedures and a failure to recognize environmental factors were responsible for expensive re-working. Again, quality control becomes involved.

So you can see that I hold quality control responsible for more than blind testing. I expect the quality control people to become tools of management—to recognize shortcoming, exert initiative—in a sense to be creative in the interest of arriving at a better product.

What does this mean? In terms of corporate profits, it is truly a matter of sink or swim. It is also a matter of life or death, because in ordnance we play with explosives which can just as easily kill or maim our friends as our enemies.

An example was the MK 45 primer for the 5-inch/54-caliber gun cartridge case. An eccentric screw-thread machine was permitting some primers to be assembled with a gap where torquing pressures would be reached without the parts going all the way home. A simple defect, yes, but failure to meet specification caused three accidents, many thousands of dollars of loss, and serious injury to a dozen men.

In each of these cases the company involved lost money and reputation. Reputation is important because it gives us the confidence to contract further with the company, and not look afield—in other words, the creation of the satisfied customer psychology.

For example, we were about to go to a particular torpedo contractor for additional torpedoes of a type he had produced in the past but, because of his quality problems in another product line, doubt was cast on his ability to produce the product he had done so well on in the past. I suppose this is much like the typical Congressional constituent who says, "Yes, I know you did me a lot of favors in the past, but what have you done for me recently?"

Company Reputation on the Firing Line

Ultimately, of course, a company's reputation for quality extends to the serviceman on the line. The one upon whom is thrust the full impact of quality control, or the absence of it, is the sailor on board ship or the marine or soldier in the jungles, rice paddies and trenches. A company's name is clearly marked on the weapons and equipment he uses, and this gives him an urgent sense of knowledge and familiarity with that name. The identity is especially vivid under conditions of combat, for in the final reckoning a company, its products, and its reputation are etched in the memory of that serviceman each time his weapon performs well, or each time his weapon fails to perform. In the last analysis this is really the essence of quality control—the ability to meet the acid test of battle, where only quality pays off—be it in men or hardware.

Yours is the challenge to get the quality into the hands of the ultimate user. The challenge is a real one. The rewards, aside from the sense of doing a job well, come in the corporate profits of the successful producer. So quality control extends to the profit motive as well as the patriotic one. A good product is only as good as the quality it keeps—and that is yours to control.

Navy To Charter Nine New Tankers

The U.S. Navy's Military Sea Transportation Service (MSTS) has entered into a charter-build agreement with the Central Gulf Steamship Co., New Orleans, La., for 9 tankers to replace 16 T-2 tankers of the MSTS fleet. Requests for proposal for this ship construction were issued to the maritime industry in July 1968. The new tankers are expected to be in service with MSTS within three years.

The ships will be built for Central Gulf by the Bethlehem Steel Co. shipyard at Sparrows Point, Baltimore, Md., at a cost to Central Gulf of $115 million. The ships will then be chartered to the Navy on a "bareboat" basis, *i.e.*, without crew, for a period of five years. The Navy will have the option of extending the charters up to a total of 25 years.

Each of the new tankers will be 595 feet long, have a 32-foot, 6-inch draft, and displace 32,000 tons. The ships will have a 12,000-mile steaming radius at 16 knots and will be conventionally powered.

Although this contract is the largest in amount of any MSTS contract involving the charter-build concept, it is not the first employing this means of acquiring ship charters. The same concept was employed in 1964 when MSTS bareboat-chartered the tanker SS Shenandoah, and in 1967 when MSTS time chartered the gas turbine roll-on/roll-off cargo ship, GTS Admiral William Callaghan.

Avionics Laboratory Critical to Air Force Technical Effort

Colonel James L. Dick, USAF

When the Air Force produced its 38 Technical Objective Documents (TODs)[1] to delineate major requirements for technical effort, the Air Force Avionics Laboratory (AFAL) found that it was assigned 9 of the 38—the largest number of these TODs pursued by a single organization.

This extensive involvement gives one indication of the breadth of subject matter handled within the Avionics Laboratory. Another indication is that approximately 400 industries, universities, and research foundations are sharing the $80-million annual research and development budget and the 821 contracts currently administered by the laboratory for the studies, reports and hardware required to cover the span of AFAL's interests.

Colonel James L. Dick, USAF, is Director of the Air Force Avionics Laboratory. He previously served as Vice Commander, Air Force Cambridge Research Laboratories. He holds a doctorate in chemistry from Ohio State University.

An additional $10 million annually supports the "in-house" operations of the laboratory which includes laboratory facilities, personnel, test gear and all types of supplies from private contractors and industries.

While individual contracts awarded through the Avionics Laboratory seldom reach the $1 million figure, the variety and type of work done by its industrial suppliers are extensive, sophisticated and often both scientifically and intellectually exciting. Based on rough estimates, there are over 600 industrial organizations in the nation with the facilities, proven technical abilities, and quality controls needed to make major contributions to the work of the laboratory.

If this 600 "guesstimate" seems unduly restrictive, consider the types of projects which the Avionics Laboratory is handling. The following examples have come to public attention just in the past year:

- **LOCATING System.** The laboratory attacked the sticky problem of the high cost of inertial navigation systems by setting up a special unit for the in-house design and developing of the Low Cost Aircraft Inertial Navigation (LOCATING) system. This system is a composite of components from various manufacturers and has achieved its goal quite well. Flight tests of the low cost system showed the performance well within design goals. Industry has received a very significant incentive to carry the success of this effort still further and make inertial navigation widely available.
- **TAPIT.** To transform a fighter aircraft into a reconnaissance plane, a contract with CBS/ Laboratories undertook to create a new *TA*ctical *P*hotographic *I*mage *T*ransmission system. Mounted in a pod under the wing, this apparatus takes motion pictures, develops them in seven seconds, and transmits them to a ground station. It allows a fighter plane loitering in the combat zone to send pictures immediately to military commanders in the field. An important element of the system is a 3/4-ton truck housing the ground station. Electronic signals arrive there from the aircraft and are immediately transformed into photographs for the ground commander.
- **Solid State Image Sensor.** The David Sarnoff Research Center of the Radio Corporation of America is fabricating an all thin film mosaic image sensor with integrated scanning that permits operation as an image pickup camera. The presently achieved 256-by-256 array, compared to 512 lines in conventional television, has potential high reliability and low cost through vacuum evaporation of solid state active and passive devices. The resulting images from this array can be displayed on a standard television monitor, thus providing cost savings and versatility.
- **Optical Collimator.** Corning Glass and the American Optical Co. combined to produce and polish the 103-inch diameter mirror which is the heart of this collimator, believed to be the largest and most precise in the world. Housed in its own air conditioned building, the completed instru-

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[1] *See article, "U. S. Air Force Technical Objective Document Program,"* Defense Industry Bulletin, *December 1968, page 14.*

ment will become a unique research tool for studying problems of optics and photography.

- **Laser Communication System.** Still in an early phase of development, this system can transmit 50 million elements of information per second—a capacity that equals 10 television stations broadcasting simultaneously. Its goal is 100 million elements per second, and its prospective use involves interplanetary transmissions, security (because the narrow laser beam is difficult for hostile forces to "jam or intercept), and the exploitation of scientific advantages which may arise once the engineers are free of the limitations imposed by electronic circuitry. The laser system was built by the Stanford Research Institute using certain basic techniques developed by researchers at the Avionics Laboratory's Electronic Technology Division—an example of the interplay that frequently exists between the laboratory and its suppliers.

- **MERA.** MERA is an electronically scanned all solid state phased array radar under development by Texas Instruments, Inc. This system combines the reliability advantages of solid state devices with the redundancy of a multi-element active antenna consisting of discrete transmitter-receiver modules. The advantages of such a system include a rapid scan and agile beam capability without the weight and high scan power required for conventional phased array antennae.

Avionics, for those not acquainted with the term, has been defined as: "technology combining concepts, airborne sensors (electromagnetic and inertial), data processing and data transmission to provide decision-making by man and control of his weapons to the target." The word was coined to represent a field of endeavor that sprang up during World War II, when it was discovered that an aircraft without 'round-the-clock capability was only a half-way effective weapon of war. Radar was frantically applied to the bomb-directing and fire-control functions, and electronic circuits were hastily developed to assist in navigation, aerodynamic and engine control, and surveillance. Within a few years we had created a new, versatile and most deadly weapon.

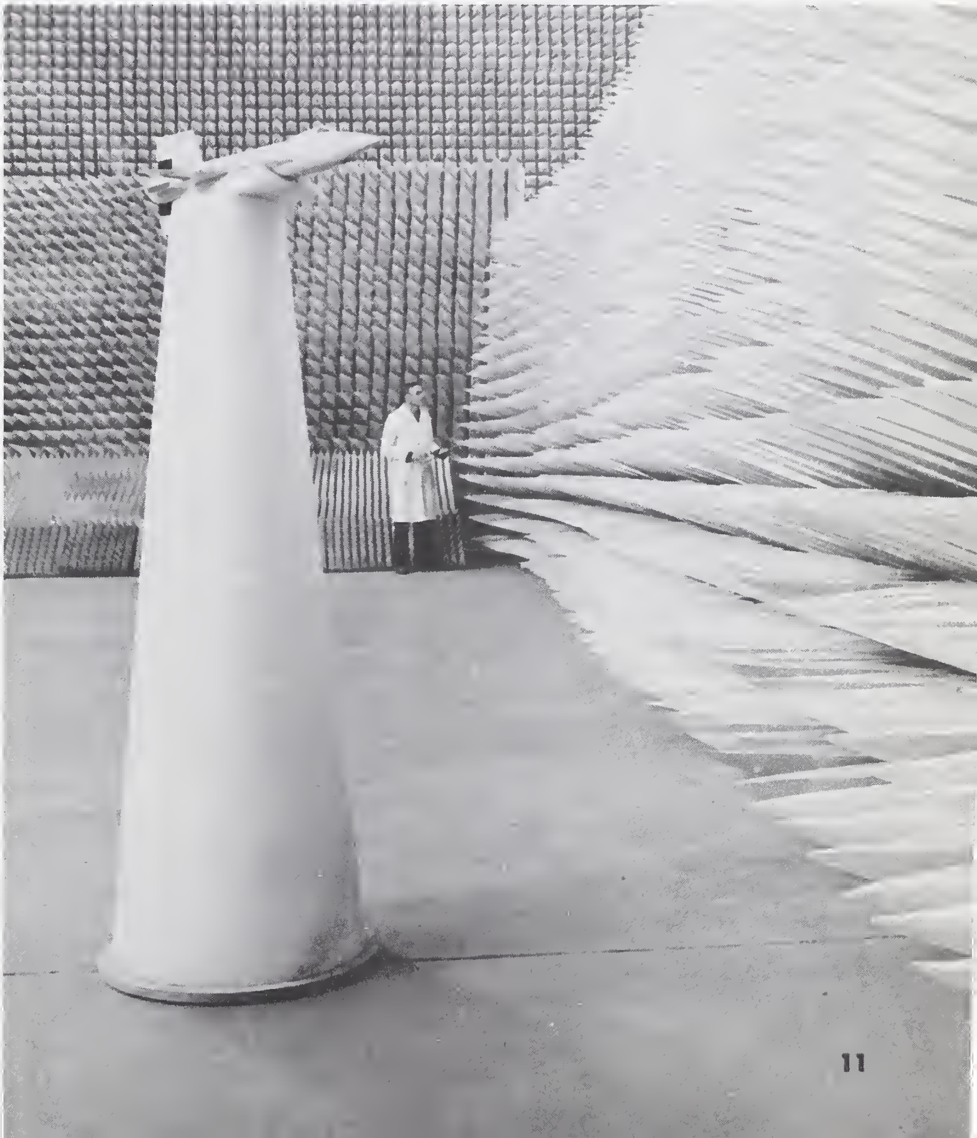
The goal of avionics now, as then, is the discovery of new techniques that will produce more effective Air Force systems and the attainment of component and circuit reliability essential to space age technology. Work toward these goals has led to a revolutionary merging of technical disciplines, adapting such sciences as biology, physics, mathematics and engineering into a smoothly integrated entity.

Because of its Air Force mission orientation, the Avionics Laboratory finds itself directly engaged in the support of Air Force operations wherever hostilities break out. Today great emphasis is being placed on reconnaissance work and weapons fire control to aid our forces in Southeast Asia.

With better than 75 percent of its total budget going to industries and to university and research foundation organizations, the laboratory acts as a considerable stimulus to the scientific community. It supports areas of technology beneficial to the Air Force and where industry should and can become proficient.

The opposite side of the fence is worked also. As a technology referral center for numerous governmental agencies like the Aeronautical Systems Division, the Space and Missile Systems Organization, the Electronic Systems Division, and others, the laboratory furnishes technical consultation to evaluate the proposals these agencies receive from industry and undertakes programs responsive to their technical needs. The laboratory

ANECHOIC CHAMBER for experimental work on problems of radar echo from Air Force vehicles is checked by an engineer prior to a test. The walls of the chamber are covered with spikes of rubber-like material impregnated with carbon to absorb, rather than reflect, radar signals. The target in this test, a model of the X–15 research aircraft (on support at left), can be measured in reflectionless surroundings, such as would occur in flight.



also acts as the focal point of the Air Force Systems Command for information in its technical areas and, in addition, works closely with the Army, Navy, National Aeronautics and Space Administration, Advanced Research Projects Agency, and other governmental agencies in aiding developments in these fields.

The calibre and diversity of the laboratory's own scientific effort has repeatedly proved a major advantage to industries grappling with Air Force scientific projects. Its nearly 600 scientists, engineers, technicians and support personnel are organized into four divisions: Navigation and Guidance, Reconnaissance, Electronic Technology and Electronic Warfare. In these divisions they are actively engaged in research efforts on electronic plasmas and solid state surfaces, in development programs of aerial photography, position and motion sensing, inertial navigation, optronics, solid state microwave and millimeter wave electronics, large scale integrated circuits, avionic and satellite communications, electronic countermeasures, laser technology, radar, infrared and ultra-violet, and a host of other programs to attack the many and varied avionic problems of the Air Force.

EXPERIMENTAL CORDLESS HEADSET for voice communications between crewmen is demonstrated by an Avionics Laboratory employee. Replacing the cord with a radio link frees crewmen from being "tied" to their equipment. The device, developed by the laboratory's Communications Branch, could be used where unrestricted mobility is desirable, in aircraft, space vehicles and for communications in ground maintenance.

Early in 1968 the laboratory was honored with the Air Force Outstanding Unit Award for achieving "major technological advancements and contributions to the security and overall scientific well-being of the nation." The laboratory's technical manpower is in continuous demand to serve on Air Force and DOD committees and study groups. Industry has routinely used guidance from the laboratory in developing its own independent research and development programs. In all of these fashions the Air Force Avionics Laboratory is accomplishing its mission: to sponsor and advance the avionics technology; and to be ready to furnish aid and guidance to other government agencies, research centers and industry toward the prompt and cost-effective solution of the Air Force needs.

Interested persons are invited to write for a free booklet, "Air Force Avionics Laboratory, Aerospace Electronics Research", which describes the work and organization of the laboratory in detail. Address: Air Force Avionics Laboratory, Attn: AVO-2, Wright-Patterson AFB, Ohio 45433.

Industrial Security Courses Scheduled in California

Field extensions of the Industrial Security Management Course have been scheduled for San Francisco and San Diego, Calif.

The San Francisco area course will be held June 2–6 at the Thunderbird Hotel, 101 Bayshore Freeway, Millbrae, Calif. The same course will be convened in San Diego June 9–13 at a site to be announced later.

Contractors desiring reservations for the San Francisco course should send requests to Merle Basom, Defense Contract Administration Services Region, San Francisco, 866 Malcolm Road, Burlingame, Calif. 94010. For information call (415) 692–0300, ext. 222.

Contractors interested in the San Diego course should contact Joseph C. Sullivan, Defense Contract Administration Services Region, Los Angeles, 11099 S. LaCienega Blvd., Los Angeles, Calif., 90045, or call (213) 643–0192 or (213) 643–1086.

DOD SETS JOINT BOARD FOR LOGISTICS REVIEW

The Defense Department has established a Joint Logistics Review Board to review world-wide logistics support to combat forces during the Vietnam era, in order to identify strengths and weaknesses and make appropriate recommendations for improvement.

Findings and recommendations of the board will be submitted directly to the Secretary of Defense and the Chairman of the Joint Chiefs of Staff by March 1, 1970. Upon completion of its final report, the board will be dissolved unless otherwise determined by the Secretary of Defense at that time.

General Frank S. Besson Jr., former Commanding General of the U. S. Army Materiel Command, has been appointed the chairman of the board. In addition to General Besson, the board's membership consists of a senior general or flag officer representing each Military Service, the Defense Supply Agency, and appropriate representation from the Joint Staff of the Joint Chiefs of Staff.

Board members assigned are:

- Lieutenant General Lewis L. Mundell, former Vice Commander, Air Force Logistics Command, as U. S. Air Force representative.
- Lieutenant General Frederick L. Wieseman, recalled from retirement to be U. S. Marine Corps representative.
- Vice Admiral (designee) Edwin B. Hooper, formerly Assistant Deputy Chief of Naval Operations (Logistics), as U. S. Navy representative.
- Lieutenant General (designee) Oren E. Hurlbut, formerly Commanding General, U. S. Army Weapons Command, as U. S. Army representative.
- Rear Admiral John W. Bottoms, former Commander Officer, U. S. Naval Supply Center, Norfolk, Va., as Defense Supply Agency representative.

Representatives of the Joint Staff are Colonel H. T. Casey, USA, and Colonel John W. Hanley, USAF. The board will be augmented by a staff furnished by the Military Services.

MEETINGS AND SYMPOSIA

APRIL

Ocean Science & Technology Advisory Committee Annual Meeting, April 23–24, at the West Auditorium of the State Department, Washington, D.C. Sponsor: National Security Industrial Assn. Contact: John H. Jorgenson, Committee Executive, National Security Industrial Assn., Suite 800, 1030 15th St., N.W., Washington, D.C. 20005, Phone (202) 296–2266.

Army **Numerical Analysis** Conference, April 24–25, at Walter Reed Army Institute of Research, Washington, D.C. Sponsor: Army Research Office—Durham. Contact: Dr. Francis G. Dressel, Mathematics Div., Army Research Office-Durham, Box CM, Duke Station, Durham, N.C. 27706, Phone (919) 286–2285.

Thin Films—Structure Sensitive Properties Conference, April 28–May 2, at Boston, Mass. Sponsors: Army Research Office—Durham and the National Aeronautics & Space Administration. Contact: Dr. Robert Mace, Dir., Physics Div., Army Research Office—Durham, Box CM, Duke Station, Durham, N.C. 27706, Phone (919) 286–2285.

Electronic Systems on the Horizon Advance Planning Briefing for Industry, April 29–May 1, at the Hexagon, Fort Monmouth, N.J. (Classified Secret). Sponsors: U.S. Army Electronics Command and the Armed Forces Communications-Electronics Assn. Contact: Technical & Industrial Liaison Office, U.S. Army Electronics Command, Fort Monmouth, N.J. 07703, Phone (201) 535–2240.

Defense Readiness and Logistics Symposium, April 30, at Fort Lesley J. McNair, Washington, D.C. Sponsors: Industrial College of the Armed Forces and the Defense Supply Assn. Contact: Capt. James K. Webster, USN (Ret.), Defense Supply Assn., 1026 17th St., N.W., Washington, D.C. 20036.

MAY

American Society for **Quality Control** Annual Technical Conference, May 5–7, at the Biltmore Hotel, Los Angeles, Calif. Sponsor: American Society for Quality Control. Contact: Robert W. Shearman, Admin. Secretary, American Society for Quality Control, 161 W. Wisconsin Ave., Milwaukee, Wis. 53203, Phone (414) 272–8575.

Third Annual **Military History** Symposium, May 8–9, at the U.S. Air Force Academy, Colo. Sponsor: Department of History, Air Force Academy. Contact: Lt. Col. William Geffen, Executive Dir., Military History Symposium, Department of History, U.S. Air Force Academy, Colo. 80840, Phone (303) 472–2316.

American **Helicopter** Society National Forum, May 14–16, at Washington, D.C. Contact: Harry M. Lounsbury, American Helicopter Society, 141 East 44th St., New York, N.Y. 10017, Phone (212) OXford 7–5168.

The Influence of Microelectronics on Management Decisions Conference, May 27–28, at the Mayflower Hotel, Washington, D.C. Sponsors: Defense Department and the National Security Industrial Assn. Contact: Paul A. Newman, National Security Industrial Assn., 1030 15th St., N.W., Washington, D.C. 20005, Phone (202) 296–2266

JUNE

Armed Forces **Communications-Electronics** Assn. Annual Convention, June 3–5, at the Sheraton-Park Hotel, Washington, D.C. Contact: W. J. Baird, Armed Forces Communications-Electronics Assn., 1725 Eye St., N.W., Washington, DC. 20006, Phone (202) 296–3033.

Army **Mathematicians** Conference, June 11–12, at St. Louis, Mo. Sponsors: Army Research Office—Durham and the Army Mathematics Steering Committee. Contact: Dr. Francis G. Dressel, Mathematics Div., Army Research Office—Durham, Box CM, Duke Station, Durham, N.C. 27706, Phone (919) 286–2286, Ext. 75.

Planning Challenges of the 1970s in Space and the Public Domain Meeting, June 17–20, at the Brown Palace Hotel, Denver, Colo. Sponsors: American Astronautic Society and the Operations Research Society of America. Contact: Dr. George W. Morgenthaler, General Program Chairman, Martin Marietta Corp., P.O. Box 179, Denver, Colo. 80201, Phone (303) 794–5211, Ext. 4557.

Aerodynamics Problems Associated **with Helicopters** and **V/STOL** Aircraft Meeting, June 18–20, at Buffalo, N.Y. Sponsors: Army Aviation Materiel Laboratories and Cornell Aeronautical Laboratory, Inc. Contact: John E. Yeates, Aerodynamics Div., Army Aviation Materiel Laboratories, Fort Eustis, Va. 23604, Phone

International **Shock Tube** Symposium, June 23–25, at the University of Toronto, Canada. Sponsor: Air Force Office of Aerospace Research. Contact: M. Rogers, Air Force Office of Scientific Research (SREM), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OXford 4–5568.

Center for High Energy Forming International Conference, June 23–27, at Estes Park, Colo. Sponsor: Army Materials and Mechanics Research Center. Contact: A. F. Jones, Associate for Technology, Army Materials and Mechanics Research Center, Watertown, Mass. 02172, Phone (617) 926–1900, Ext. 401.

JULY

Environmental Effects on Antenna Performance Meeting, July 7–18, at Boulder, Colo. Sponsors: Air Force Cambridge Research Laboratories and the Environmental Science Services Administration. Contact: Philip Blacksmith, Air Force Cambridge Research Laboratories (CRDG), L. G. Hanscom Field, Mass. 01730, Phone (617) 274–6100, Ext. 3704.

National Seminar of the **National Classification Management Society**, July 22–24, at the Mayflower Hotel, Washington, D.C. Contact: James J. Bagley, Seminar Chairman, Naval Research Laboratory, Washington, D.C. 20390, Phone (202) 574–2391.

"Truth in Negotiations"

An Audit Task of the Defense Contract Audit Agency

William B. Petty

One of the most discussed aspects of government contracting today is "defective pricing." Defective pricing clauses which are currently being inserted into certain defense contracts are the result of Public Law 87–653, commonly referred to as the "Truth in Negotiations" Act. The purpose of this article is to discuss Defense Department implementation of Public Law 87–653, primarily in terms of the responsibilities assigned to the Defense Contract Audit Agency.

Background

While defective pricing is currently receiving widespread attention within industry and Government, it is not a new subject. As early as 1958, the Air Force required certain certifications of costs by contractors. Starting about 1959, the General Accounting Office issued a series of reports criticizing the Defense Department for failure to achieve sound contract prices in negotiated contracts. In 1961, the Armed Services Procurement Regulation (ASPR) was amended to require defense contractors to furnish cost or pricing data in certain circumstances, and to certify that the data was accurate, complete and current. Despite the incorporation of these requirements in the ASPR, the General Accounting Office continued to report overpricing resulting from contractors' failures to submit the required data, or the failure of the Defense Department to disclose that such data were defective. These reports were a major factor influencing the passage of Public Law 87–653, effective Dec. 1, 1962.

What was the philosophy that brought Public Law 87–653 into being? Here are a few examples:

- There were too many instances in which contractors, negotiating for defense business, took advantage of favored positions as sole source suppliers and succeeded in getting unjustified prices. This was accomplished by introducing improper estimates of costs where the contractor should have known better.
- Because of the climote in which many pre-award evaluations and negotiations are conducted, government personnel could not hope to smoke out all errors or omissions before contract award.
- Some mechanism was needed for contract adjustments where defective cost data resulted in unreasonable prices.
- The law itself would influence the contractors to be more thorough, more accurate, more complete, and more current in preparing price proposals.

Public Law 87–653 was intended to give the Government a legal right to adjust the contract price, where the contract price was based on inaccurate, incomplete, or noncurrent cost or pricing data. It is important to note that Congress deemed it necessary to put the full force and effect of law behind pricing requirements, even though the provisions of the law were already substantially covered in the ASPR.

After enactment of the law, the ASPR was amended to conform to statutory provisions. However, there was a gap in the ASPR coverage in that no particular agency or activity in defense procurement was given direct responsibility for conducting a specific and definite program for assuring compliance with the law. For example, contract administration people were knowledgeable about the law, but they had no good way to find out whether contractors were observing it. Contract auditors had been instructed to report instances of defective pricing which came to their attention as they went about their regular audit work. However, relatively few instances of defective pricing were brought to the contracting officers' attention so that they could deal with them.

William B. Petty is Director, Defense Contract Audit Agency, a position he has held since its organization. Previously, he was Deputy Comptroller of the Air Force. During his military service career, he served in auditor general assignments. He was graduated from the University of Illinois, and is a Certified Public Accountant.

The General Accounting Office meanwhile continued to audit in this area and, late in 1965, issued a report which recommended, among other things, that the Defense Contract Audit Agency (DCAA) should be required to establish a formal program for conducting defective pricing reviews. The Defense Department adopted this recommendation and DCAA was delegated this responsibility.

One can readily recognize the difficulties inherent in this entire program. The real question is whether a contractor, who provides cost or pricing data and executes a pricing certificate, has made known to the contracting officer—at the proper time in the negotiation and contracting process—all matters then known to him which influence the contract price. Who knew what, at exactly what time, is not easily determined. It is very difficult, in many circumstances, for the Government to prove defective pricing, even if it does exist; and it is equally difficult for a contractor to defend himself against it for exactly the same reasons.

DCAA Responsibilities

By DCAA Regulation 7640.6, issued March 1966, the Defense Contract Audit Agency formally established a program for regularly scheduled post-award reviews of selected contracts, to determine compliance with Public Law 87–653. A copy of this regulation was published in the Congressional Record and in various information media to which contractors subscribe.

The regulation states that "the objective of a defective pricing review consists of a factual determination that all information or data available to the contractor was either properly or improperly reflected, by cost element, in the contractor's proposal." To meet this objective, DCAA's responsibility is to select contracts for review, make the examinations, reach a conclusion about whether defective pricing exists, and prepare a report to the cognizant contracting officer. The contracting officer is responsible for deciding whether defective pricing exists, and then for dealing with the contractor to obtain appropriate contract adjustments.

There are several considerations that DCAA auditors recognize in conducting defective pricing reviews:

- That the purpose of the review is to determine whether there has or has not been compliance by the contractor with the Public Law 87–653 —no more and no less.
- That an audit is being conducted, not an investigation.
- That the chronology of events is extremely important—"what" happened "when" is often the real question.
- That any findings and recommendations must be well founded and provable. The burden of proof is on the Government.

Throughout the agency, we recognize that all contracts with defective pricing clauses cannot possibly be examined. Therefore, a program has been developed for selecting contracts for review to ensure that DCAA is adequately accomplishing its portion of the total DOD responsibility under the law. In selecting these contracts, we are strongly influenced by the confidence—or lack of confidence—we have in the reliability of contractor's proposals, based on our past experience.

Progress in Program Performance

The fiscal year that ended June 30, 1968, is the first year which could be considered representative of our progress in performing defective pricing reviews. During that year we examined, for defective pricing purposes, 582 contracts and subcontracts, with a total contract value of about $3.8 billion. Of this number, we found 104 contracts where there were indications of inaccurate, incomplete, or noncurrent pricing data. We recommended contract adjustments of $18.6 million.

Since DCAA was organized in July 1965, we have made defective pricing reviews on 953 contracts with a total value of about $9 billion, and have identified 146 in which the cost or pricing data appears to have been defective, recommending about $32 million in contract adjustments. However, we cannot assess the true savings to the Government as the result of our work at this point in time.

After we release an audit report in which contract adjustments are recommended, the contracting officer then enters into discussions with the contractor. These discussions, and a final decision about what should be done, are often time consuming. Therefore, the final outcome of all reports which we have issued is not known. Information that is available indicates that where settlements have been reached, out of $6.8 million which we have proposed, contracting officers have made contract adjustments of $4.7 million, with net final savings of $2.7 million.

It should be recognized that many of the contracts which we have reviewed as of this point in time were awarded in 1965 and 1966. Since that time, DOD has made a very strenuous effort to cause contractors to improve the quality of cost and pricing data which they submit. It is entirely possible, if these efforts are productive, that we will, in the future, identify fewer instances of defective data in relation to the total number of contracts examined.

There should also be an improvement in the quality of cost and pricing data as a result of the DOD program for survey and evaluation of contractor estimating methods and procedures. This program is also the responsibility of the Defense Contract Audit Agency. As of Dec. 31, 1968, we have surveyed and reported on more than 200 estimating systems. We believe this program has been quite productive in influencing contractors to more painstakingly prepare their price proposals, and to prepare them in an environment where better internal and managerial control is brought to bear.

What Is and What Is Not Defective Pricing?

The questions could be asked, "What is defective pricing?" and "What is not defective pricing?" I cannot give a complete and all inclusive answer to either question, but experience may be of some help.

Circumstances that are not defective pricing.

Illustrations of circumstances which will *not*, in and of themselves, support findings of defective pricing are:

- Subsequent to the award of the contract, a significant difference is noticed between proposed costs and experienced costs.
- After completion of the contract, it is found that the profit actually realized on the contract was higher than profit contemplated at the time of negotiation.

- Subsequent to the completion of the contract, it turns out that contingency provisions proposed to and accepted by the contracting officer did not materialize.
- The original proposal disclosed facts as to historical costs, but projected that costs for the future would be higher, and such projections accepted by the contracting officer did not materialize.
- Estimates (or judgment) contained in the original proposal turned out to be wrong, *e.g.*, labor productivity was higher than anticipated; or actual cost of an item of material was less than proposed, due to such conditions as changes in market conditions or an advantageous buy.

Circumstances that indicate defective pricing.

Conversely, the following illustrate circumstances which may be the basis for findings of defective pricing:

- Subsequent to submission of the original proposal but prior to agreement on price, firm quotations are received or purchase orders are awarded at prices significantly less than those indicated in the original proposal. This information was not disclosed to the contracting officer.
- The original proposal was supported in part by a "priced out" bill of material which, subsequent to agreement on price, was found by the Government to have been overstated because the costing data used were obsolete. For example, firm quotations received from suppliers, prior to agreement on price, bid prices substantially less than purchase order prices from a prior contract which had been used to "price out" the bill of material.
- The original proposal contained a "make or buy" plan stating which parts or components were to be bought and which were to be made in-house; however, prior to agreement on price, the "make or buy" plan was changed in a manner which resulted in incurrence of significantly less costs. Such a change was evidenced by a series of plant work orders, providing for in-house manufacture of a number of parts and components that had been identified as "buy" items in the original "make or buy" plan. These data were not disclosed to the contracting officer.
- The labor estimate in the original proposal was based upon the actual labor experience on a prior contract for an item that was similar, but not identical, to the item to be contracted for; however, prior to agreement on price, a complete time and motion study for the item was performed which demonstrated that the labor estimate was overstated. These data were not disclosed to the contracting officer.
- The original proposal was based, in part, on the continued use of manufacturing processes and machinery utilized in the past; however, prior to agreement on price, a management decision was made to acquire new equipment and use new processes (to be used during the period of the contract). This decision was evidenced by the minutes of a board of directors meeting, fixed asset appropriations, and requests for quotations sent to suppliers for this new equipment. This decision was not disclosed to the contracting officer.
- The original proposal contained an estimate for overhead and general and administrative costs, based upon the overhead and general and administrative rates for the prior fiscal year; however, before agreement on price, the company's budgets for future production, sales, etc., approved by top management, indicated a sizable increase in volume, resulting in significant reductions in overhead and general and administrative rates. The data in these budgets were not disclosed to the contracting officer.

In summary, we find defective data in all major areas of cost. It is not confined to the material costs but runs the range of material, overhead, labor rates, failure to use past experience, make versus buy, duplicate charges, and subcontracting.

Living With the Law

How can contractors "live with" the law? Some key points for consideration by contractors are offered:

- Develop, formalize and use an estimating system to assure that cost data is prepared and submitted in a controlled environment.
- Speed up internal information flow to assure that all elements of the organization, which need knowledge of a subject at a particular point in time, have such knowledge.
- Be as certain as humanly possible that cost and pricing data submitted are accurate, complete and current. Remember that the language of the law provides for adjustment "to exclude any *significant* sums by which it may be determined . . . that . . . the price was increased because the contractor . . . furnished cost or pricing data which . . . was inaccurate, incomplete, or noncurrent." [Emphasis added.]
- Give more effort to compliance, and less effort to fighting the facts.
- Recognize that a government contractor deals with the public, and not with just any customer. Operating under a government contract will not be a business-as-usual environment.
- Be content with a reasonable profit for the work done.
- Be sure that complete disclosure is made to the contracting officer or his representatives of all matters known to the organization which have a bearing or influence on anticipated contractual costs.

Administration of the Law

Contractors should keep two things in mind in dealing with DCAA auditors under this program.

First, the Congress has felt the need for and has enacted this law. DCAA has the responsibility, delegated by the Defense Department, to assist in the administration and implementation of the law. To meet this responsibility, our objective is to perform this effort in such a manner that both the public and the contractors will receive fair and equitable treatment.

Second, in accomplishing its responsibility, DCAA's sole function is to perform defective pricing reviews and report findings to the contracting officers, who will consider our reports and decide if contract adjustments are in order.

How Public Law 87–653 affects a contractor is much more in his own hands than in the hands of the government people who administer the law. This is not an impossible or even an unreasonable law to observe. The law seeks to assure one thing—"truth in negotiations," so that the contracting parties may be fully knowledgeable about significant matters which affect the price when they meet to negotiate. If contractors do the kind of job they should in estimating prices and identifying the data they used, and if they make full disclosure of all significant matters to the contracting officers, there should be few instances where a contract adjustment is necessary.

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U.S. Government Printing Office
Washington, D.C. 20402.

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RESEARCH REPORTS

Organizations registered for service may obtain microfiche copies of these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

All organizations may purchase microfiche copies (65¢) or full-size copies ($3) of the documents (unless otherwise indicated) from:

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ABOUT PEOPLE

DEPARTMENT OF DEFENSE

The following key appointments, reappointments and nominations have been made in the Office of the Secretary of Defense:

Dr. John F. Foster Jr. has retained his position as Dir., Defense Research & Engineering. **VAdm. Vincent P. de Poix**, USN, has been appointed as Dep. Dir. (Administration Evaluation and Management).

Robert F. Froehlke has succeeded **Solis Horwitz** as Asst. Secretary of Defense (Administration). Mr. Froehlke was sworn in Jan. 30. **David O. Cooke** is serving as Acting Principal Dep. Asst. Secretary.

Robert C. Moot has been reappointed as Asst. Secretary of Defense (Comptroller). No changes have been made of key officials in his office.

Barry J. Shillito was sworn in as the new Asst. Secretary of Defense (Installations & Logistics) Feb. 1. He succeeds **Thomas D. Morris.**

G. Warren Nutter has replaced **Paul C. Warnke** as Asst. Secretary of Defense (International Security Affairs).

Robert T. Kelley has succeeded **Alfred B. Fitt** as Asst. Secretary of Defense (Manpower & Reserve Affairs). **VAdm. William P. Mack**, USN, will serve as his Dep. Asst. Secretary replacing **Lt. Gen. J. B. Lampert**, USA.

Daniel Z. Henkin is serving as Acting Asst. Secretary of Defense (Public Affairs). He replaces **Phil G. Goulding**. Mr. Henkin served as Dep. Asst. Secretary under Mr. Goulding. **Richard G. Capen Jr.** and **Jerry W. Friedheim** have been designated as Mr. Henkin's deputies.

Dr. Ivan Selin is serving as Acting Asst. Secretary of Defense (Systems Analysis). He replaces **Alain Enthoven.** Dr. Selin joined the Defense Department in 1965 and has been serving as Dep. Asst. Secretary (Strategic Programs) under Dr. Enthoven.

Gen. Horace M. Wade, USAF, has replaced **Gen. Theodore W. Parker**, USA, as Chief of Staff, Supreme Headquarters Allied Powers Europe. Gen. Parker retired Feb. 1.

Capt. Robert R. Campbell, USN, has been assigned to command the Defense Contract Administration Services, Region, Boston, Mass.

Col. **James T. Jones**, USAF, and Col. **Philip C. McMullen**, USAF, have been assigned to the Defense Atomic Support Agency, Sandia Base, N.M. Col. Jones is the new Dir. of Test Operations. Col McMullen will serve as Dep. Dir. of Test Command.

Col. Stewart C. Meyer, USA (brigadier general designate) is now serving as assistant to the Dep. Dir., Defense Research and Engineering (Tactical Warfare Programs).

DEPARTMENT OF THE ARMY

Secretary of Defense Laird has announced three nominations for positions in the Department of the Army. They are: **Thaddeus R. Beal** for assignment as Under Secretary of the Army; **William K. Brehm** to continue as Asst. Secretary of the Army (Manpower & Reserve Affairs); and **Eugene M. Becker** for reappointment as Asst. Secretary of the Army (Financial Management).

Lt. Gen. Ferdinand J. Chesarek has been named to replace **Gen. Frank S. Besson Jr.** as Commanding General, Army Materiel Command. He was promoted to four-star rank with the assignment. Gen. Chesarek is a native of Calumet, Mich., where he was born Feb. 18, 1914. He was graduated from West Point in 1938. He served as Comptroller of the Army from August 1966 to August 1967 and served as Asst. Vice Chief of Staff, U.S. Army before assignment as head of the Army Materiel Command.

Gen. Besson has been reassigned to duty as Chairman, DOD Joint Logistics Review Board.

Maj. Gen. William E. DePuy has been assigned to replace Gen. Chesarek as Asst. Vice Chief of Staff, U.S. Army.

Maj. Gen. Clarence J. Lang, has been selected to be Commander, Military Traffic Management & Terminal Service (MTMTS). He replaces **Maj. Gen. John J. Lane**, who has retired.

Maj. Gen. David P. Gibbs has been recalled from retirement as an adviser and consultant to the U.S. program-project manager for the Mallard Project.

Dr. William L. Archer has been appointed Scientific Advisor to the Commanding General of the Institute of Land Combat, an element of Army Combat Developments Command, Fort Belvoir, Va.

Dr. Russell D. Shelton has succeeded **Dr. Edward K. Kaprelian** as Technical Dir., Army Limited War Laboratory, Aberdeen Proving Ground, Md.

William B. Taylor has been selected as Technical Dir., Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.

Army Combat Developments Command, Fort Belvoir, Va., announces the assignment of **Col. Arthur S. Hyman** as Dir. of Organization.

Col. Cornelius J. Molloy Jr. is the new Dir. of Infantry Materiel Testing at the Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

Col. William G. Stewart became the District Engineer, Army Corps of Engineers at Chicago, Ill., in March.

Lt. Col. Ralph A. Barker has been assigned to the Army Strategic Communications Command, East Coast Telecommunications Center, as Commanding Officer.

Lt. Col. Philip A. Woolaver is now serving as Dep. Commander, Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.

DEPARTMENT OF THE NAVY

Secretary of Defense Melvin R. Laird has announced five nominations for positions in the Department of the Navy. They are: **John W. Warner** to be Under Secretary of the Navy; **Frank Sanders** to be Asst. Secretary of the Navy (Installations

& Logistics); **James D. Hittle** as Asst. Secretary of the Navy (Manpower & Reserve Affairs); **Robert A. Frosch** to continue as Asst. Secretary of the Navy (Research & Development); and **Charles A. Bowsher** to continue as Asst. Secretary of the Navy (Financial Management).

Two new assignments have been made in the Office of the Chief of Naval Operations. **RAdm. William N. Leonard** will serve as Asst. Dep. Chief of Naval Operations (Development). **Capt. Robert B. Baldwin** (rear admiral selectee) is the new Dir., Aviation Program Div.

RAdm. George M. Davis Jr. (Medical Corps) has been selected as Chief of the Bureau of Medicine and Surgeon General of the Navy.

Capt. Max H. Allen has been assigned duty as Commanding Officer, Naval Public Works Center, Great Lakes, Ill.

Capt. Don E. Hihn has been selected as Commanding Officer, Naval Weapons Station, Charleston, S.C.

Capt. Daniel M. Karcher will serve as the new Project Manager, Navy Logistics Information System Project, Naval Material Command.

Capt. Donald H. Kern has been named as the new Commanding Officer of the Portsmouth, N.H., Naval Shipyard.

DEPARTMENT OF THE AIR FORCE

The Secretary of Defense has announced three nominations for positions in the Office of the Secretary of the Air Force. They are: **John L. McLucas**, to be Under Secretary of the Air Force; **Curtis W. Tarr**, to be Asst. Secretary of the Air Force (Manpower & Reserve Affairs); and **Grant L. Hansen**, to be Asst. Secretary of the Air Force (Research & Development).

Gen. Joseph R. Holzapple has been assigned the Commander-in-Chief, U.S. Air Forces in Europe, and Commander, Fourth Allied Tactical Air Force. Gen. Holzapple was promoted to the rank of general with the assignment.

Also announced was the assignment of **Lt. Gen. Marvin L. McNickle** as Dep. Chief of Staff (Research and Development), Hq., USAF.

The following named brigadier generals have been nominated for appointment to the grade of major general:

Clifford J. Kronauer Jr., Commander, Air Force Western Test Range, Vandenberg AFB, Calif.; **Russell K. Pierce Jr.**, Commander, Air Weather Service, Military Airlift Command, Scott AFB, Ill.; **Franklin A. Nichols**, Commander, Ground Electronics Engineering Installation Agency, Griffiss AFB, N.Y.; **Paul R. Stoney**, Vice Commander, Air Force Communications Service, Scott AFB, Ill.; **Kenneth W. Schultz**, Dep. for Minuteman, Space & Missile System Organization, Norton AFB, Calif.; **William F. Pitts**, Dep. Dir. of Budget, Office of Air Force Comptroller, Hq., USAF; **Louis L. Wilson Jr.**, Vice Commander, Space & Missile Systems Organization, Los Angeles, Calif.; **Felix M. Rogers**, Dep. Chief of Staff (Development Plans), Hq., AFSC, Andrews AFB, Washington, D.C.; and **William W. Snavely**, Vice Commander, Oklahoma City Air Materiel Area, Tinker AFB, Okla.

The following named colonels have been nominated for appointment to the grade of brigadier general:

James O. Frankosky, Dep. Dir., Strategic & Defense Forces, Office of Dep. Chief of Staff, Research & Development, Hq., USAF; **Jessup D. Lowe**, Commander, Air Force Satellite Control Facility, Los Angeles, Calif.; **Vernon R. Turner**, Commander, Air Force Data Systems Design Center, Bolling AFB, Washington, D.C.; **Thomas P. Coleman**, Public Affairs Officer, Pacific Command; **Peter R. DeLonga**, Chief, Logistics Operations Div., Office of Dep. Chief of Staff, Systems & Logistics, Hq., USAF; **Charles I. Bennett Jr.**, Executive to Chief of Staff, Hq., USAF; **James R. Pugh Jr.**, Chief, Procurement & Production Div., F–111 System Program Office, Wright Patterson AFB, Ohio; **Brian S. Gunderson**, Exec. Asst. to the Secretary of the Air Force; **Geoffrey Cheadle**, Exec. to Commander, AFSC, Andrews AFB, Washington, D.C.; **Floyd H. Trogdon**, Vice Commander, Electronic Systems Div., AFSC, L. G. Hanscom Field, Mass.; **Harold E. Collins**, Chief, Aerospace Systems Div., Office of Dep. Chief of Staff, Research & Development, Hq., USAF; **Benjamin N. Bellis**, Dep. for Recon., Aeronautical Systems Div., AFSC, Wright-Patterson AFB, Ohio; **Lew Allen Jr.**, Dep. Dir., Advanced Plans, Directorate of Special Projects, Office of the Secretary of the Air Force; **Billie J. McGarvey**, Dep. Chief of Staff (Civil Engineering), AFLC, Wright-Patterson AFB, Ohio.

Two assignments have been listed by Hq., USAF: **Col. William D. Hatcher** as Asst. Dir., of Information and **Col. Henry B. Stelling, Jr.** as Asst. Dep. Dir for Advanced Development, with duty station at the Directorate of Special Projects, Los Angeles, Calif.

Assignments to key positions within the Air Force Systems Command are:

Col. William K. Bailey, Dir. of Development Engineering, Air Force Contract Management Div., Los Angeles, Calif.; **Col. Arthur W. Banister**, Chief, Systems Engineering Satellite Control Facility, Los Angeles, Calif.; **Col. William D. Baxter**, Dir., Mission Module, Space & Missile Systems Organization, Los Angeles, Calif.; **Col. Joseph M. Dubois**, Chief, Propulsion Subsystems Div., Aeronautical Systems Div., Wright-Patterson AFB, Ohio; **Col. Gonzalo Fernandez**, Dep. Dir., Test Ops, Manned Orbiting Lab, Space & Missile Systems Organization, Los Angeles, Calif.; **Col. John R. Hansen**, Dir., Development Engineering, Aeronautical Systems Div., Wright-Patterson AFB, Ohio; **Col. Milton S. Jones**, Chief, Aircraft & Missile Test Div., Armament Development & Test Center, Eglin AFB, Fla.; **Col. Robert T. Marsh**, Asst. Dep. for Recon., Aeronautical Systems Div., Wright-Patterson AFB, Ohio; **Col. Floyd H. Mason**, Dir., Engineering Standards, Aeronautical Systems Div., Wright-Patterson AFB, Ohio; **Col. Richard L. Miner**, Dep. Systems Prog. Dir., Advanced Manned Strategic Aircraft, Aeronautical Systems Div., Wright-Patterson AFB, Ohio.

The following assignments to key positions have been made by the Air Force Logistics Command:

Maj. Gen. William H. Reddell, Vice Commander, San Antonio Air Materiel Area, Kelly AFB, Tex.; **Col. Edward J. Bartlett**, Chief, Commodities Procurement Div., Sacramento Air Materiel Area, McClellan AFB, Calif.; **Col. Bruce E. Mills**, Chief, Research Div., Advanced Logistics Systems Center, Wright-Patterson AFB, Ohio; **Col. Charles Y. Schultz Jr.**, Vice Commander, Ground Electronics Engineering Installation Agency, Griffiss AFB, N.Y.; and **Col. Milton Stamatis Jr.**, Dir., Procurement Management, Hq., AFLC, Wright-Patterson AFB, Ohio.

America's Largest Food Operation

Feeding the Troops

Herbert W. McCarthy

From foraging to freeze-dried foods is a long step, but this has been the progress of military feeding over the years.

In 1775, when Congress prescribed the first ration, among other items included were such necessities as candles (for guards), soft soap (or hard soap), and spruce beer or cider (molasses could be substituted), no one would dare to imagine that servicemen in future combat operations would be eating hot meals regularly. Yet this has been the trend over the years until, in Vietnam, over 90 percent of the meals served to our personnel are hot meals consisting of the same food items that are served in garrison situations.

Herbert W. McCarthy is Program Analyst in the Directorate for Food Service, Office of the Assistant Secretary of Defense (Installations and Logistics). Following five years military service and employment in private industry, he joined the Navy Department. He was Director of the Planning and Comptroller Department, U.S. Navy Finance Center, before assuming his present position in 1966. He has a B.S. degree in Business Administration from Boston College.

Early History of Military Food Service

In 1794, Congress saw the need for prescribing a different ration for the Navy from that which it has specified for the Army 19 years earlier. The Navy was given different items in consideration of the varied circumstances under which sailors would be fed. Also some thought was given to the necessity for preventing shipboard illnesses which were common among seafaring men at that time. Thus, the Military Services started along separate paths in developing food service programs for their members. This basic difference among the Services was continued when, in 1947, the Air Force became a separate Service but kept the Army ration. However, in reality, while the differences between the Services continued, the reasons for the differences began to disappear. As more sophisticated ships were built, the equipment designed for shipboard use became more comparable to the equipment found in land installations. Improvements in packaging and preservation methods made a wider variety of food available for use on board ships and on the ground. Technological improvements made it possible for military feeding to more closely resemble commercial feeding. Finally, the similarities between the Services became more apparent than any previous differences. Thus it was no surprise when, in 1966, the Logistics Management Institute recommended to the Secretary of Defense that he establish a focal point for food service matters within his office.

DOD Directorate for Food Service Created

Former Secretary McNamara established a Directorate for Food Service within the Office of the Assistant Secretary of Defense (Installations and Logistics) in July 1966. The mission assigned to the directorate was to develop a uniform food service program for all of the Military Services and to improve that program wherever technological changes made it possible. To insure a full knowledge of all current programs and to provide for participation by all Services in development of a single program, the directorate was staffed with one officer from each of the four Military Services and one civilian. Captain James A. Warren, USN, was appointed director and continues to serve in that capacity.

After the initial staffing was completed, joint Service task groups were formed to study all areas of food service and make recommendations for improvement and standardization among the Services. The task group efforts were completed in the summer of 1967, and their recommendations began to take on life almost immediately.

Single Allowance for All Services

While the task groups were at work, the directorate developed a uniform food allowance for enlisted members of all of the Military Services. Basically, this allows all servicemen the same daily monetary value of food regardless of their parent Service. Thus the basic difference between the Services was overcome.

Uniform Food Service Program

The next step was to develop a set of standards and objectives for this new program. This gave birth to what is now known as the Department of Defense Uniform Food Service Program. Standards set forth in this program show that DOD has begun to make its program more comparable to that of private industry. The standards call for:

- Development and use of standard menus supported by standard recipes.
- Cafeteria-style feeding using salad bars, bulk beverage dispensers, a la carte breakfasts, and optional short-order meals, wherever practicable. The preferred dinnerware is either compartmented trays or plate service, whichever is more practical under local conditions.
- Dining facility decor consistent with that found in first-class commercial cafeterias.
- Food service personnel engaged in the preparation and serving of food to be neatly attired in appropriate food service uniform.
- Formal training in food service management and operations for food service management personnel and structured on-the-job training (OJT) for all personnel not receiving formal training, with OJT assistance to be provided by Food Management Teams.
- Common food service accounting and reporting procedures throughout DOD.

Food Planning Board

With these six standards set as the minimum requirements for military feeding, then came the problem of implementation. Starting with the basic item in the program—food—the Department of Defense Food Planning Board was established, chaired by the Director for Food Service. The board provides uniform recipes and menus for the Defense Department. Using the new Armed Forces Recipe Service, the board has spent the last six months testing a standard 42-day cycle menu at selected installations throughout the United States. All Services participated in the test and are currently evaualting the results.

Two committees have been established under the board. The Armed Forces Recipe Service Committee, headed by the Navy, has developed a single recipe service for use in all military feeding. This recipe service was published in February 1968. The committee retains responsibility for maintaining the recipe service and making changes to it. The Product Evaluation Committee, chaired by the Army, is responsible for the introduction of new products into the DOD Food Service Program.

Single Contact for New Products

Now there is one point of contact through which a product can be placed into the feeding program of all of the Military Services—the Armed Forces Product Evaluation Committee. This eliminates the need for vendors to contact each Service individually to introduce a new product. Food items brought into the program can be placed into recipes for use by all Services through the efforts of the Armed Forces Recipe Service Committee. Not only does this arrangement aid industry representatives seeking to present their products for DOD use, but suggestions from units in the field are also forwarded to the appropriate committee for action.

At this point it is well to note that the Surgeon General of the Army was assigned the responsibility for developing nutritional standards to be utilized by the DOD Food Planning Board in planning menus and recipes. The nutritional standards have been spelled out and are included in the menu just tested.

Facilities and Equipment

In conjunction with the establishment of a food planning board, it was also deemed appropriate to set up a joint Service board to develop standard designs for dining halls and other food service facilities, and to prepare a food service equipment catalog and operation manual. One function of the DOD Food Service Facility and Equipment Planning Board is to maintain liaison with industry food service research and development activities to insure that all modern food service technological advances are considered for incorporation in the DOD Food Service Program.

Contractual Food Service

As a part of the overall DOD effort to eliminate military personnel where

SERVING LINE in a typical military dining hall. The goal of military food service operations world-wide is nutritious and delicious, attractively prepared and served food. This dining hall is at Kelly AFB, Tex.

no military need exists, the Military Services have been directed to review all food service positions and determine those which meet certain specified requirements for military staffing. Those positions which do not meet these requirements are subject to civilian staffing either through direct hire (Civil Service employees) or by the use of contractor services.

In connection with the possible expansion of contractor-operated food service, current contract specifications and procedures are being reviewed with an eye toward attracting more food service contractors into active participation in the DOD Food Service Program.

Personnel Training

In spite of the increasing trend toward civilianization of the program, large numbers of military personnel will always be needed in food service. These personnel must be well trained, not only as cooks and bakers, but as food service managers. During the past year the Army and Air Force initiated use of Food Management Teams composed of senior food service specialists. Like the Navy and Marine Corps teams which have been active for several years, the Army and Air Force specialists visit activities to assist in on-the-job training, and to give advice and guidance to aid local personnel in improving food service at the local level.

In addition to the field efforts, the Military Services are jointly developing programs of instruction and curricula to provide for improved formal training in common areas of food service. Instruction peculiar to the needs of one Service will be carried out by the Service concerned.

Research and Development

Another area of interest is that of research and development as it relates to food items, packaging, equipment, systems, and related functions. The Department of the Army has been given this responsibility for the entire Defense Department. The Army has assigned this function to the U. S. Army Natick Laboratories at Natick, Mass.

Personnel at Natick Laboratories are now engaged in the development of a long-range research and development program in support of the DOD Food Service Program. This effort is two-pronged; it will treat both field and garrison feeding. There is no question that the broad experience of Natick Laboratories in support of earlier food programs will be a substantial asset to the overall improvement effort. For example, a new field feeding concept called SPEED is now in the field evaluation phase at Natick.

SPEED is an acronym for "Subsistence Prepared by Electronic Energy Diffusion," but more aptly applies to its basic purpose which is to set up and feed a company-size unit in a short period of time. Equipped with two microwave ovens, the unit can cook 100 pounds of roast beef in just one hour, compared with the conventional three and one-half hours. An ovenload of bread can be baked in 9 minutes, as opposed to 25 in a regular oven. The SPEED unit is completely self-contained in a 12-by-7-by-8-foot pod which can be carried in the bed of a 2½-ton truck or towed on its own transporter wheels. For rapid delivery, the unit can be airlifted by helicopter. The introduction of this type of unit into field feeding situations may be the answer to combat feeding problems of today.

Looking to the future we recognize that improving the kitchen is not enough. Food items being served must change, labor requirements must be held to a minimum, and technical skill requirements must be lowered in order to feed more people on a world-wide basis. Private industry needs to become a partner in this future planning.

Industry Participation

Support is currently being given to the DOD program by industrial organizations such as the National Restaurant Association, the National Security Industrial Association, and the Research and Development Associates. It is believed that through a constant interchange of information the DOD Food Service Program will keep abreast of technological and managerial improvements achieved by its commercial counterpart. On the other hand, industry, knowing the course which DOD intends to follow, will be able to provide a responsive base to support the program. Such common commercial items as convenience foods, improved packaging and preservation techniques, high-speed cooking equipment, and others will be introduced into military feeding as rapidly as practical.

Some of the areas currently being

DOD Food Service Board and Committees

Food Planning Board

Chairman, DOD Food Planning Board
Directorate for Food Service, OASD(I&L)
Room 2B 323—Pentagon
Washington, D. C. 20301

Recipes

Chairman, Armed Forces Recipe Service Committee
Navy Subsistence Office—Building 166
Washington Navy Yard
Washington, D. C. 20390

Products

Chairman, Armed Forces Product Evaluation Committee
U.S. Army Food Service Center
1819 W. Pershing Road
Chicago, Ill. 60609

Food Service Facility and Equipment Planning Board

Chairman, DOD Food Service Facility and Equipment Planning Board
Office of Chief of Engineers
Department of the Army
2226—Building T-7
Washington, D. C. 20315

spotlighted by industry task groups are:

- Contractual food service (National Restaurant Association).
- Joint Service recipes, food service equipment, a food service magazine, sanitizing procedures, automated food service, food service executive training, and a food service program of the future (National Security Industrial Association).
- Use of carcass versus boneless meats, review of specifications, stable compact foods, easy-open cans, flexible packaging, single-pack spices and seasonings, and food service systems (Research and Development Associates).

As the program continues, new task groups may be formed and others, having completed their assignments, will be dissolved. This DOD-private industry relationship is increasingly necessary in the ever changing food service field.

Future Development

Continual changes in the food service industry point the way to future food service operations. Increased automation of food service must be reckoned with in the military as well as in private industry. Increasing dependence upon electronic data processing equipment is just as true in the military as in civilian life. The Defense Department, long a leader in the use of EDP equipment, must eventually bring subsistence accounting and development of requirements into the EDP systems of the Military Services. Menu planning itself has already proven to be susceptible to computerization in some areas of institutional feeding. This concept is under serious consideration for DOD use in the not too distant future.

Military labor is no longer considered as a free commodity. Instead, labor-cost tradeoffs must be considered in the same way as private industry has been forced to consider them due to rising labor costs and a shrinking labor market.

Pre-formed and pre-cooked foods must be evaluated. This creates a new world of problems to be resolved, such as the design of specifications, storage requirements, and the total logistics system necessary to support their use. These are problems to be overcome—not avoided.

The DOD Food Service Program of the future must be carefully thought out and developed. The program must include not only static feeding situations, but also take into consideration field feeding on a worldwide basis—in hot and cold climates, under high and low humidity, on land, at sea, and in the air—in countries which bear little resemblance to the United States in terms of resources. This last consideration makes it clear that the military food service system must be a complete development, not only of food items but also of storage, transportation, and other equipment.

The problems confronting the DOD Food Service Program are similar to those faced by private industry—rising costs (already, food cost alone is approximately $1 billion annually), shrinking labor market, loss of skills, and an increasing demand for timely and round-the-clock services. Add to this the unique problems of combat, shipboard, in-flight, and under-water feeding, and the result is a challenge to all of our research and development capabilities.

The ultimate goal is to keep the U.S. serviceman well fed with an adequate diet of the food he likes to eat. Whether in the future he receives his food from a neatly attired cook or a sophisticated, automated system, or carries it in his pocket or on his back in a field or combat situation, this is the objective—and the challenge.

New Energy Absorber Boosts Runway Safety

The first aircraft arresting system developed for operational rather than emergency use is now saving pilots and planes at 14 sites in Southeast Asia. Known as BAK–13, the new arresting system is designed primarily for the F–4 aircraft and can be ready at a moment's notice—taking only 90 seconds to recycle. The system was developed by the Air Force System Command's Aeronautical Systems Division, Wright-Patterson AFB, Ohio.

Basically, the system consists of two identical energy absorbers positioned at opposite sides of the runway. An arresting cable spans the runway and is connected to the absorbers by giant nylon tapes which unwind from reels located atop each energy absorber.

The tape reel is keyed to a shaft which, in turn, is keyed to a vaned rotor or paddle wheel immersed in a coolant fluid. When an aircraft engages the cable it causes the tape to unwind, activating the water brake which absorbs the kinetic energy of the aircraft.

As the aircraft rolls down the runway, the submerged paddle wheel spins around in the solution. The resultant turbulence created in the tub brakes the speed of the aircraft. The kinetic energy then is converted to heat energy which is dissipated by a circulatory coolant system.

BAK–13 can stop aircraft traveling at 190 knots and weighing 50,000 pounds, such as a fully loaded F–4, or it can stop aircraft traveling 156 knots and weighing 80,000 pounds.

The simple and rugged construction of BAK–13 provides advantages from maintenance, logistic and operational standpoints. Components last longer and can withstand higher loads. Because of these features, it can be used much longer than previous arresting systems.

The system will eventually be used in conjunction with rapid air base construction.

Nuclear Explosion Simulator Operational at Kirtland AFB

The Air Force claims to have the world's two largest X-ray machines. They are part of a new facility at Kirtland AFB, N.M., established to study the effects of nuclear radiation on electronics.

The larger of the two X-ray machines weighs 450 tons and is 90 feet long. The smaller one weighs 130 tons and is 60 feet long.

Under the operational supervision of the Air Force Special Weapons Center, the huge X-rays produce brief pulses of intense radiation which simulate the gamma rays generated by a nuclear explosion. Electronic equipment to be tested is placed in a cell which is shielded by high density concrete walls five feet thick and massive lead doors weighing 94 tons each.

Tests in the facility will help the Air Force and industry design and build electronic equipment with increased resistance to radiation.

F–15 Engine Definition Contracts Awarded

The Air Force has obligated initial funding increments totaling $2.7 million for contract definition of engines for the F–15 fighter aircraft. Awards were made to Pratt and Whitney Aircraft Division of United Aircraft Corp. ($1.242 million), W. Palm Beach, Fla.; and to the Aircraft Engine Division of the General Electric Co. ($1.458 million), Evendale, Ohio.

Under separate initial engine development contracts awarded to these companies in August 1968, work is progressing on prototype engines from which the Air Force's F–15A and the Navy's F–14B engine versions will be developed.

These contracts, expected to total $3.834 million, will produce refined data integrated specifically with the F–15 airframes now in competitive development by Fairchild Hiller, McDonnell Douglas, and North American Rockwell. Final proposals for this aircraft will be based in part on these data.

DOD Asks $2.4 Billion for FY 1970 Military Construction

The Defense Department has submitted to the Congress a Military Construction Authorization Bill for FY 1970 totaling $2,474,014,000, requesting new authorization in support of the Military Services, the Defense Agencies, and the Reserve Components.

Projects for which authorization has been requested are located at 288 named military installations in the United States, and at overseas bases in the Caribbean, Europe, Pacific Islands, Japan and Korea.

The main objective of the proposed construction is to strengthen and improve the combat readiness and capabilities of military land, sea and air forces wherever they are stationed, and to provide them with the modern facilities required to support the advanced weapons and defensive systems with which they are equipped.

Included in the total authorization request is $694,418,000 for military family housing and $1,850,000 for homeowners assistance. Construction of new family housing units accounts for $108,332,000 of the total amount, with 4,800 units being planned for construction in the United States and overseas. The balance represents continuing requirements necessary for maintenance and operation, improvements to existing quarters, leasing costs, and payments of principal and interest on mortgage obligations.

Proposed Military Construction Authorization for FY 1970

	U. S. Locations	Overseas Locations	Locations Not Specified	Total
Army	$ 831,637,000	$127,706,000	$ —	$ 959,343,000
Navy	303,803,000	49,971,000	—	353,774,000
Air Force	297,916,000	54,213,000	—	352,129,000
Reserve Components	40,000,000	—	—	40,000,000
Defense Agencies	45,597,000	1,903,000	25,000,000	72,500,000
Subtotal	**$1,518,953,000**	**$233,793,000**	**$ 25,000,000**	**$1,777,746,000**
Military Family Housing	—	—	—	694,418,000
Homeowners Assistance	—	—	—	1,850,000
Total	**$1,518,953,000**	**$233,793,000**	**$ 25,000,000**	**$2,474,014,000**

Stoppable Rotor Concept Subject of USAF Study

The Air Force is conducting a one-year computer study of stoppable rotor aircraft to develop analytical engineering methods in predicting stability and control during the conversion stage.

The study program is designed to reduce technical risks encountered when rotors are stopped and started, stowed and unstowed, and conventional flight is performed.

Two stoppable rotor concepts will be studied. The first concept is a horizontal stoppable rotor in which the stopped blades are folded at the same level that the rotors operate. The second is one that tilts the rotor forward, stops the blades, and folds them backward into a streamlined position.

Prediction methods will consider the rotor disk angle of attack, blade azimuth position, collective and cyclic blade pitch, effects of coupling between the body and rotor of the aircraft, blade dynamic and aeroelastic characteristics, and other effects.

The computer program is being developed by the Bell Aerospace Corp., Helicopter Div., Fort Worth, Tex., under the direction of the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio. Robert Nicholson is the laboratory's project engineer.

Methods developed by the Bell Corp. are intended for use in preliminary design and evaluation of stoppable rotor aircraft concepts. Prediction methods will be used for aircraft conversions occurring between 115 and 230 miles an hour, at disk loadings up to 15 pounds a square foot, blade loadings up to 120 pounds a square foot, and aircraft gross weights up to 100,000 pounds. Methods will be developed for use over a broad range.

No tests will be conducted during the study, but test results and data obtained from related programs will be used to validate the prediction methods developed. Programs developed will be demonstrated on high-speed digital computers at the Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio.

Army Awards Study Contracts for New Rocket System

Contracts totaling more than $2.5 million in value have been awarded to five companies for development proposals on the Army's new Multiple Artillery Rocket System (MARS II) planned for the 1970s. MARS II will be the Army's first attempt to combine multiple launch and guidance capabilities in a rocket system.

Contract specifications call for each company to perform a six-month study. The Army will select a base line concept from these studies to proceed into a contract definition phase.

MARS II is intended to be a simple, rugged, reliable, low-cost tactical artillery rocket system. Considerable work on the system has already been conducted by Army laboratories. The program is now under the management of the MARS II Product Office at the Army Missile Command, Redstone Arsenal, Ala. Lieutenant Colonel Wayne B. Miller is the product manager.

Concept design study contracts went to: Chrysler Corp., Missiles Div., Warren, Mich.; LTV Aerospace Corp., Missiles & Space Div., Warren, Mich.; The Boeing Co., Space Div., Huntsville, Ala.; Northrop Corp., Nortronics-Huntsville, Ala.; and Martin-Marietta Corp., Orlando, Fla.

Second Source TOW Contract Awarded

The U.S. Army has awarded a $2.9 million contract to Chrysler Corp. Huntsville Space Operation as an alternate producer of the tube launched optically sighted wire guided (TOW) missile. Chrysler will initially produce only a few of the new anti-tank missiles. If those missiles qualify and are tested successfully, the Army has the option to buy more.

The Army ordered TOW into production last month by awarding a $55 million contract, the first increment of a $140 million package, to Hughes Aircraft Co., the prime contractor.

Chrysler was one of 63 contractors asked to submit proposals during second source competition. Selection was made by the Army Missile Command.

THE 40MM GRENADE LAUNCHER, attached to the underside of the M16A1 rifle, is prepared for firing by an infantryman. In combination with the rifle, the launcher gives the soldier a dual capacity of point and area fire.

Army Forms Small Arms Agency at Aberdeen, Md.

The Army Materiel Command has formed a new agency to study small arms weaponry in an effort to insure that American soldiers will always be armed with the best individual weapon systems available.

The new organization is called the U.S. Army Small Arms System Agency and is located at Aberdeen Proving Ground, Md.

Formation of the new agency came as a response to the Army's need for new and complete system approaches to individual weapons, including rifles, pistols, shotguns, grenade launchers, machine guns, associated ammunition, mounts and sights. The agency will perform as a management group, initially detailed from within the Army Materiel Command, rather than as an operational laboratory.

Responsibilities of the Small Arms System Agency will include determining the need for small arms weaponry, and the identification and exploitation of technological resources within the DOD structure and industry to meet these needs. The organization will also serve as a clearing house for ideas and designs for development of small arms weaponry for the infantryman of the 1970s.

Through control of technical and financial resources, the agency will integrate existing individual weapons capabilities of the Army Munitions Command, the Army Weapons Command, and the newly designated Army Research and Development Center, Aberdeen, Md.

The agency will have contractual authority, as well as authority to direct the integrated small arms systems effort of in-house agencies. It is foreseen that responsibility for an item will be retained by the agency, upon completion of development phases, through the first production phase.

Colonel Walter E. Rafert is Commanding Officer and Director of the Small Arms Systems Agency, with Leonard B. Ambrosini designated as Acting Technical Director.

Conversation Between Two Small Businessmen:

Snaring Government Contracts

Colonel John Bex, USAFR

Participants: Harry Faust, President
Consolidated Gadget Corp.

Bill Martin, Owner
United Widget Works

Place: In the office of Bill Martin.

Time: 10:00 a.m., Dec. 2, 1968.

Faust: What junk! Here's another article talking about opportunities for small businessmen to sell to the Defense Department. That stuff really burns me up.

Martin: Why?

Faust: Why? Because everybody knows it can't be done. The small business doesn't have a chance against the mammoth corporation. Read any newspaper. The big multi-million dollar contracts—where do they go?

Martin: To big multi-million dollar companies, right?

Faust: Right!

Martin: And that's all you ever hear about, right?

Faust: Right.

Martin: So from our point of view as small businessmen, that's bad?

Faust: You bet, that's bad!

Martin: Well, let me tell you a little secret. In a way that's good. I mean, it has a good side to it once you understand it and know how to take advantage of it.

Faust: What?

Martin: Well, it is a fact that small business does get an opportunity to compete for the Defense Department contract spending, however small you may think it is. Contracts with small businesses don't make headline news but there are many of them, and they do exist. Congress, in fact, enacted legislation to insure that small business gets a fair share. You and I feel that this small business share should be larger. Now, so does Congress and the Administration generally. Special effort is being made continuously to increase the small business share of the defense dollar. The Small Business Administration, the Defense Department, and the two select committees for small business in the House of Representatives and the Senate are continually fighting for and protecting small business. That's the good side of the story, if you're one of the minority of small businessmen who understand this and know how to take advantage of it. Many of them still mistakenly believe it's hopeless, so they don't try. This reduces the competition and make it easier for those of us who do try.

Faust: Well, have you tried?

Martin: Yes—and succeeded. I just landed a defense contract last month.

Faust: No kidding!

Martin: No kidding. Now you know why I believe it's possible—because I've done it. Confidentially, it wasn't so hard—no more red tape than doing business with any other branch of our Government. This is just between ourselves, of course, because

Colonel John E. Bex, USAF Reserve, is a Special Project Officer in the Office of the Deputy for Small Business, Directorate of Procurement Policy, Deputy Chief of Staff (Systems and Logistics) at Hq. Air Force.

now when I hear some of the boys saying that doing business with bureaucrats is so impossible, sometimes I don't even bother to argue with them. Why should I? Their ignorance just increases my chances.

Faust: Okay, I'm with you there. I'm willing to become one of those like yourself who try and succeed. So what's the secret?

Martin: It's a big secret all right! It boils down to this: You find out what is required and then try to fulfill the requirements—the secret of successful business anywhere. It's an open secret. In fact, it's all spelled out in several government publications. But then an open secret is often the best kind. I mean, if you don't read the publications, then what's in them is a secret to you. Right?

Faust: Right.

Martin: And that's not all. There are officials, hundreds of them in fact, whose full-time job is helping small businesses in getting their share of government business. They are called small business specialists by the Army, Navy, Air Force and the Defense Supply Agency, and procurement center representatives by the Small Business Administration. But if you don't talk to them, then how can they help you?

Faust: Okay. Go on with the story. How does the thing work, and how do I get started?

Martin: Well, as you may know, the Defense Department buys, or procures as they say it, a lot of things through a formally advertised bidding process. It solicits bids for certain items from suppliers or contractors who are on its lists in the various categories. The invitation for bid includes a detailed description including drawings, with government specifications of what is wanted

Faust: So I'd be smart to get on the Defense Department lists for the things I'm interested in?

Martin: Right. You inform the purchasing office concerned that you want to bid on certain items and supply the purchasing office certain information about your ability to carry out defense contracts. When you count all three Services—Army, Navy and Air Force—and the Defense Supply Agency, they operate approximately 525 offices throughout the country. Go to the nearest one. That office can give you information on all its local needs and may have information on the needs of the other offices. The Defense Department is big and is organized to do a good job. The facts about your ability are put on a Standard Form 129, the Bidders Mailing List Application, and its supplement. When the application is completed, you send it to each purchasing office where you have an interest. In the case of certain products, the invitation for bid may specify that the item to be purchased is on a Qualified Products List, a QPL item.

Faust: Qualified products, eh? Sounds like the Government is getting to be a smarter buyer.

Martin: A whole lot smarter than in some of the old days you may have heard about. But, remember, its our taxpayer dollars they're spending. Whose Defense Department is it?

Faust: Oh sure, that's fine with me. I really prefer to do business with someone who is business-like. Some of the things I've heard, like some of those percent of cost contracts, where the more money you waste the more you make, burn me up. No businessman in his right mind would ever think of agreeing to such a thing.

Martin: You will be glad to know that such contracts don't exist anymore. Those cost-plus a percentage of cost contracts are now prohibited by law. Also, this filing of qualifications for undertaking contracts, and the like, helps the small business as well as the Defense Department.

Faust: How so?

Martin: Well, it helps to protect the small business from making totally unrealistic bids on contracts which it might not be able to carry out, or could fulfill only at a considerable loss to the firm. After all, an accepted bid or award becomes a formal contract but a bad, unsound contract is generally an unpleasant problem for all concerned—Defense Department and business firm. Of course, not all products or services are purchased through the bidding system. Some things are purchased through a technique called negotiations which still means that there is free and open competition. But even here, all procurement offices make use of their bidders lists.

Faust: I see that I should apply to be put on the proper lists, all right! But how do I find out more about the lists? How can I get even a general idea of who is buying what to begin with?

Martin: Well, you can get an excellent overall picture from this pamphlet right here on my desk. It's called "Selling to the Military" and is published by the Defense Department. It has extensive lists of military purchasing offices, and details the items purchased by Defense Agency or Military Service. In fact, it pretty well lives up to its intent "to provide business firms, which have little or no experience in selling their products or services to the Department of Defense, with basic steps and initial contacts for locating sales opportunities." Oh sure, there is a lot of other literature, too, which you can pick up at any one of the 81 Small Business Administration offices in the country or order from them. In fact, many different procurement offices at the various military installations have issued brochures on the very subjects we're talking about. But this pamphlet is about as good a source to start with as any. It contains a pretty thorough discussion of how to do business with the Defense Department.

Faust: What about day-to-day needs, and defense contracts and bids, etc.? Do I have to chase this down through a lot of newspapers in different parts of the country, or in publications of the various Services?

Martin: Definitely not! There is a special publication which takes care of that called the *Commerce Business Daily*—the *Wall Street Journal* for knowing about government business. It will keep you posted as to the action. It carries Defense Department proposed procurements estimated to exceed $10,000, and civilian agency procurements expected to exceed $5,000. You can refer to it in any military procurement office or local Small Business Administration office. A year's subscription costs only $15. Just send your check and name and address to the Superintendent of Documents, *Commerce Business Daily,* Government Printing Office, Washington, D. C. 20402. It maintains a very comprehensive coverage, including a daily list of U. S. Government invitations to bid, subcontracting leads, contract awards, sales of surplus property, and foreign business opportunities.

Faust: Say, that's an interesting angle right there—information about subcontracting leads.

Martin: It certainly is. For many small businesses like ours, subcontracting may be as rich a source of business opportunity as prime contracting can be. At least, I know in my case I first started out with what turned out to be some excellent subcontracts, and I always have my eyes open for new leads.

Faust: I begin to see how I can get started in the game if that's all you need. And I guess I can manage as much political influence as you have, and you have already scored.

Martin: That's not hard, since I don't have any such influence at all. All joking aside, you'll find the whole affair more routine and business-like than you may have imagined. Contracting officers, as purchasing agents are called nowadays, are mainly interested in making a good business deal—just as you and I.

Faust: I'd think so, considering whose money they are spending!

Martin: Come to think of it, I've hardly mentioned yet the most important source of information and aid.

Faust: What's that?

Martin: People. I mean the various persons whose job it is to assist you in doing business with the Government. Many of them, like the officials of the Small Business Administration, focus exclusively on the needs and problems of the small businessman. It's their full-time job. They're experts at it and without exception are willing and eager to fill you in on any aspect you're interested in. Mr. Taxpayer, you're paying for it all so you might as well make use of some of those fine services offered. You don't have to go down to Washington to get counsel and help since, as I said, there is a local Defense Department Small Business Advisor Office at the Army Depot near here which may, in any case, be better acquainted with local needs and opportunities.

Faust: What about the procurement offices of the government agencies and Military Services themselves, local or otherwise?

Martin: Obviously, it is very worthwhile to get acquainted and talk with those people since they are the number one source of information on procurement of defense requirements. In fact, they're usually delighted to talk with you because it is their business to improve and enlarge their lists of good suppliers. You may be just the man to provide a new element of healthy competition in a situation where the Defense Department has been seeking additional suppliers. Let's not forget requirements of the military and opportunities to do business with the Defense Department are constantly changing, so you've got to keep in contact in one way or another to stay ahead or be current.

Faust: Well, it's encouraging to know that the cards aren't stacked against me from the start. A small business today has enough problems with financing, cash flow, and the like, as it is.

Martin: Far from it. In fact, the cards have in some instances, in a very real sense, been stacked in your favor. Congress and the Executive Branch, through the Small Business Administration and the Defense Department, have made several deliberate moves in this direction. Ever hear of "set-aside procurements?"

Faust: No, what are they?

Martin: Well, all defense procurement activity is clearly spelled out in a "Bible" called ASPR, the Armed Services Procurement Regulation. This regulation states that on all contracts of $2,500 or more, procurement contracting officers should give consideration to all or part of a procurement being set aside for exclusive awarding on a competitive basis to small business concerns. Many such "set-aside" purchase opportunities for small businesses are listed in the *Commerce Business Daily.*

Faust: Okay. I get the picture. I can see I don't need to feel like David facing Goliath in going out after a defense contract. But frankly, why does the Government go to this trouble to aid and even favor the small businesses?

Martin: I think it's simply sound economics for one thing. The value of the small business concern to the general well being of this country's economy was recognized by the Congress to such an extent that it deemed it appropriate to establish, under law, organizations and policies which could protect small businesses throughout the country.

Faust: I read in the *Wall Street Journal* the other day that the country's 5 million small businesses will produce 40 percent of our $800 billion Gross National Product this year. Big business could not exist without the small business. So I guess we're important for the Government to look after.

Martin: The President says, "Small business is big business."

Status of Funds Report

Outlays

July-October, Fiscal Year 1969

(Thousands of Dollars)

Department of Defense	Outlays					Unpaid obligations	
	Jul 1968	Aug 1968	Sep 1968	Oct 1968	Cum thru 31 Oct 1968	At start of year	As of 31 Oct 1968
Military Personnel							
Active forces	1,494,806	1,666,853	1,721,041	1,767,306	6,650,006	761,917	1,079,415
Reserve forces	103,168	114,825	77,516	75,132	370,641	149,746	124,618
Retired pay	188,789	193,197	195,990	197,931	775,907	6,880	6,298
Undistributed	6,986	−50,791	45,935	−12,066	−9,936	—	9,936
Total—Military Personnel	1,793,748	1,924,085	2,040,483	2,028,302	7,786,618	918,543	1,220,267
Operation and Maintenance	1,443,402	1,807,543	1,855,893	1,696,547	6,803,385	4,033,198	5,256,353
Procurement							
Aircraft	784,553	778,362	791,947	784,237	3,139,099	9,591,226	8,636,683
Missiles	138,900	203,163	172,604	225,963	740,630	2,069,735	2,603,625
Ships	142,710	142,298	150,859	183,744	619,611	3,447,418	3,478,122
Tracked combat vehicles	24,486	30,213	31,898	46,495	133,092	610,190	591,165
Ordnance, vehicles and related equipment	47,079	599,159	465,391	514,536	1,626,165	6,595,367	8,550,115
Electronics and communications	76,376	108,381	145,352	133,244	463,353	1,881,334	1,707,228
Other procurement	94,731	164,114	193,608	189,198	641,651	2,056,183	2,059,813
Undistributed	318,543	27,211	−7,228	3,164	341,690	−7,225	−348,363
Total—Procurement	1,627,380	2,052,898	1,944,433	2,080,577	7,705,288	26,244,228	27,278,379
Research, Development, Test, & Evaluation							
Military sciences	73,628	85,159	80,085	77,712	316,584	777,774	758,867
Aircraft	81,834	22,459	76,223	88,030	268,546	717,451	745,832
Missiles	172,188	199,987	152,843	225,163	750,181	983,018	1,581,566
Astronautics	113,919	111,529	104,178	101,841	431,467	487,480	577,410
Ships	23,830	23,686	25,670	28,639	101,825	245,279	335,201
Ordnance, vehicles and related equipment	18,524	25,128	22,183	29,182	95,017	216,577	289,768
Other equipment	54,544	59,729	57,242	71,803	243,318	478,981	547,099
Program-wide management and support	42,329	70,776	65,451	38,377	216,933	189,338	201,477
Undistributed	4,444	−28,496	16,642	−7,620	−15,030	−1,633	10,588
Total—Research, Develop., Test, & Eval.	585,241	569,957	600,515	653,128	2,408,841	4,094,265	5,047,810
Military Construction	62,086	100,649	117,040	139,414	419,189	1,784,255	1,884,082
Family Housing	39,866	32,516	45,027	45,928	163,337	174,687	236,257
Civil Defense	5,459	9,299	7,011	7,040	28,809	80,629	66,872
Other—Special Foreign Currency Program	172	8	57	272	509	1,071	611
Revolving and Management Funds	−72,553	−62,277	−163,576	94,272	−204,134	6,078,411	6,830,774
Subtotal—Military Functions-Federal Funds	5,484,801	6,434,677	6,446,883	6,745,481	25,111,842	43,409,287	47,821,405
Military Assistance—Federal Funds	59,831	34,200	47,503	56,461	197,995	1,823,034	1,713,616
Grand Total—Federal Funds	5,544,632	6,468,877	6,494,386	6,801,942	25,309,837	45,232,322	49,535,021
Total—Military Functions-Bud. Concept adj.	−9,189	−2,386	−15,956	−7,922	−35,453	8,794	1,922
Total—Mil. Assistance-Bud. Concept adj.	74,899	35,466	5,294	22,149	137,808	433,454	287,496
Grand Total—Budget Concept adjustments	65,710	33,080	−10,662	14,227	102,355	442,248	289,418
Total—Department of Defense	**5,610,342**	**6,501,957**	**6,483,724**	**6,816,169**	**25,412,192**	**45,674,570**	**49,824,439**

Department of the Army

Military Personnel							
Active forces	527,967	695,272	701,390	719,582	2,644,211	382,077	583,781
Reserve forces	75,373	79,140	53,028	49,893	257,434	112,578	83,286
Undistributed	−12,297	−47,087	−15,779	30,105	−45,058	—	45,058
Total—Military Personnel	591,043	727,325	738,639	799,580	2,856,587	494,654	712,125
Operation and Maintenance	502,235	713,947	642,095	695,366	2,553,643	1,541,708	1,706,015
Procurement							
Aircraft	67,740	93,251	95,712	92,318	349,021	1,343,518	1,310,078
Missiles	18,182	52,414	42,981	52,328	165,905	629,712	958,663
Tracked combat vehicles	22,050	32,151	30,752	37,744	122,697	586,046	568,098
Ordnance, vehicles, and related equipment	−170,833	377,356	304,330	193,574	704,427	3,445,481	4,551,820
Electronics and communications	−17,933	28,137	69,463	53,808	133,475	688,774	653,044
Other procurement	3,221	47,394	57,792	49,204	157,611	769,510	696,537
Undistributed	367,630	−4,672	−19,990	12,681	355,649	−7,225	−362,335
Total—Procurement	290,056	626,032	581,040	491,657	1,988,785	7,455,816	8,375,904
Research, Development, Test, and Evaluation							
Military sciences	6,868	9,987	11,076	10,397	38,328	98,272	110,684
Aircraft	8,619	13,554	5,780	8,128	36,081	78,199	87,130
Missiles	37,426	62,111	48,583	56,173	204,293	386,366	568,838
Astronautics	933	429	766	908	3,036	7,865	6,595
Ordnance, vehicles, and related equipment	11,056	12,962	12,464	14,977	51,459	110,532	135,271
Other equipment	24,895	26,364	24,897	29,960	106,116	196,748	209,780
Program-wide management and support	6,954	7,164	8,002	8,581	30,701	33,898	40,932
Undistributed	14,161	−3,779	11,244	−2,095	19,531	−1,633	−23,973
Total—Research, Develop., Test, & Eval.	110,912	128,792	122,811	127,030	489,545	910,247	1,135,257
Military Construction	19,914	35,183	36,398	45,363	136,858	768,046	783,319
Revolving and Management Funds	78,982	−29,058	17,082	6,093	73,099	1,955,905	1,816,863
Army—Federal Funds	1,593,142	2,202,221	2,138,065	2,165,089	8,098,517	13,126,377	14,529,482
Army—Budget Concept adjustments	−2,888	6,395	−10,532	−5,545	−12,570	10	−101
Total—Department of the Army	**1,590,254**	**2,208,616**	**2,127,533**	**2,159,544**	**8,085,947**	**13,126,387**	**14,529,381**

Department of the Navy

	Outlays					Unpaid obligations	
	Jul 1968	Aug 1968	Sep 1968	Oct 1968	Cum thru 31 Oct 1968	At start of year	As of 31 Oct 1968
Military Personnel							
Active forces	476,994	442,348	506,925	522,167	1,948,434	225,093	287,772
Reserve forces	13,760	16,181	12,851	12,281	55,073	22,898	26,181
Undistributed	−1,927	8,780	44,091	−45,758	5,186	—	−5,186
Total—Military Personnel	488,827	467,309	563,867	488,690	2,008,693	247,991	308,767
Operation and Maintenance	354,321	448,899	583,130	321,465	1,707,815	1,466,352	1,967,290
Procurement							
Aircraft	260,523	241,987	205,634	235,593	943,737	3,218,049	2,825,659
Missiles	22,954	41,530	38,725	43,149	146,358	547,934	780,518
Ships	142,710	142,298	150,859	183,744	619,611	3,447,418	3,478,122
Tracked combat vehicles	2,436	−1,938	1,146	8,751	10,395	24,144	23,058
Ordnance, vehicles, and related equipment	101,588	107,632	109,758	180,882	499,860	1,713,934	1,815,182
Electronics and communications	46,187	54,603	32,550	42,999	176,339	645,301	588,128
Other procurement	13,181	73,979	82,489	119,095	288,744	1,143,225	1,253,862
Undistributed	−6,857	−696	14,085	−9,942	−3,410	—	3,410
Total—Procurement	582,723	659,394	635,246	804,270	2,681,633	10,740,005	10,767,939
Research, Development, Test, and Evaluation							
Military sciences	14,216	15,124	16,463	17,152	62,955	121,458	153,842
Aircraft	25,238	25,009	26,435	37,724	114,406	257,524	278,368
Missiles	71,978	63,975	48,802	57,944	242,699	258,025	476,621
Astronautics	1,290	1,578	1,965	1,416	6,249	16,259	20,649
Ships	23,830	23,686	25,670	28,639	101,825	245,279	335,201
Ordnance, vehicles, and related equipment	7,468	12,166	9,719	14,205	43,558	106,045	154,497
Other equipment	9,359	8,069	10,152	10,785	38,365	79,604	110,761
Program-wide management and support	15,586	34,304	34,986	8,978	93,854	133,064	117,482
Undistributed	536	−620	2,597	−2,983	−470	—	470
Total—Research, Develop., Test, & Eval.	169,501	183,292	176,788	173,860	703,441	1,217,258	1,647,891
Military Construction	15,852	31,180	37,664	46,633	131,329	573,575	677,743
Revolving and Management Funds	−42,795	57,412	−133,170	124,003	5,450	2,269,078	2,249,200
Navy—Federal Funds	1,568,429	1,847,486	1,863,525	1,958,921	7,238,361	16,514,258	17,618,831
Navy—Budget Concept adjustments	−3,260	−5,769	−4,882	895	−13,016	110	387
Total—Department of the Navy	**1,565,169**	**1,841,717**	**1,858,643**	**1,959,816**	**7,225,345**	**16,514,368**	**17,619,218**

Department of the Air Force

Military Personnel							
Active forces	489,845	529,233	512,726	525,557	2,057,361	154,747	207,862
Reserve forces	14,035	19,504	11,637	12,958	58,134	14,270	15,151
Undistributed	21,210	−12,484	17,623	3,587	29,936	—	−29,936
Total—Military Personnel	525,090	536,253	541,986	542,102	2,145,431	169,017	193,077
Operation and Maintenance	493,743	551,087	545,020	593,123	2,182,973	927,881	1,457,078
Procurement							
Aircraft	456,290	443,124	490,601	456,326	1,846,341	5,029,659	4,500,946
Missiles	97,764	109,219	90,898	130,486	428,367	892,089	864,444
Ordnance, vehicles, and related equipment	116,321	113,170	51,030	139,449	419,970	1,434,835	2,182,622
Electronics and communications	47,889	23,525	42,869	36,005	150,288	539,008	460,100
Other procurement	75,897	39,614	51,100	19,632	186,243	100,001	66,053
Undistributed	−42,958	33,081	−1,175	297	−10,755	—	10,768
Total—Procurement	751,204	761,732	725,323	782,193	3,020,452	7,995,592	8,084,936
Research, Development, Test, & Evaluation							
Military sciences	11,875	14,982	12,763	12,971	52,591	104,162	110,309
Aircraft	47,977	−16,104	44,008	42,178	118,059	381,728	380,334
Missiles	62,784	73,901	55,458	111,046	303,189	338,627	536,107
Astronautics	111,696	109,522	101,447	99,517	422,182	463,356	550,166
Other equipment	20,290	25,296	22,193	31,058	98,837	202,629	226,558
Program-wide management and support	19,789	29,308	22,463	20,818	92,378	22,376	43,063
Undistributed	−10,253	−24,097	2,801	−2,542	−34,091	—	34,091
Total—Research, Develop., Test, & Eval.	264,159	212,807	261,133	315,046	1,053,145	1,512,878	1,880,630
Military Contstruction	25,582	33,800	42,587	46,213	148,182	425,858	407,308
Revolving and Management Funds	−36,524	−40,728	−17,813	−51,324	−146,389	521,170	1,503,823
Air Force—Federal Funds	2,023,254	2,054,951	2,098,236	2,227,353	8,403,794	11,552,396	13,526,854
Air Force—Budget Concept adjustments	−3,039	−3,012	−756	−3,055	−9,862	8,675	1,636
Total—Department of the Air Force	**2,020,215**	**2,051,939**	**2,097,480**	**2,224,298**	**8,393,932**	**11,561,071**	**13,528,490**

Defense Agencies/Office of the Secretary of Defense	Outlays					Unpaid obligations	
	Jul 1968	Aug 1968	Sep 1968	Oct 1968	Cum thru 31 Oct 1968	At start of year	As of 31 Oct 1968
Military Personnel							
Retired Pay	188,789	193,197	195,990	197,931	775,907	6,880	6,298
Operation and Maintenance	93,104	93,609	85,648	86,593	358,954	97,258	125,970
Procurement							
Ordnance, vehicles, and related equipment	3	1,001	273	631	1,908	1,117	491
Electronics and communications	233	2,116	470	432	3,251	8,251	5,956
Other procurement	2,432	3,127	2,227	1,267	9,053	43,447	43,361
Undistributed	728	−502	−148	128	206	—	−206
Total—Procurement	3,396	5,742	2,822	2,457	14,417	52,815	49,602
Research, Development, Test, & Evaluation							
Military sciences	40,669	45,066	39,783	37,192	162,710	453,882	384,032
Military Construction	738	486	391	1,205	2,820	16,777	15,712
Family Housing	39,866	32,516	45,027	45,928	163,337	174,687	236,257
Other—Special Foreign Currency Program	172	8	57	272	509	1,071	611
Revolving and Management Funds	−72,216	−49,902	−29,675	15,500	−136,293	1,332,258	1,260,887
Defense Agencies—Federal Funds	294,518	320,722	340,043	387,078	1,342,361	2,135,628	2,079,366
Defense Agencies—Budget Concept adjustments	−2	—	214	−217	−5	—	—
Total—Defense Agencies	**294,516**	**320,722**	**340,257**	**386,861**	**1,342,356**	**2,135,628**	**2,079,366**
Office of Civil Defense							
Civil Defense	5,459	9,299	7,011	7,040	28,809	80,629	66,872
Revolving and Management Funds	—	—	—	—	—	—	—
Total—Office of Civil Defense-Fed. Funds	**5,459**	**9,299**	**7,011**	**7,040**	**28,809**	**80,629**	**66,872**
Military Assistance							
Military Personnel	16	40	11	28	95	353	289
Operation and Maintenance	19,863	18,438	21,497	18,606	78,404	230,840	226,983
Procurement							
Aircraft	14,132	7,642	3,246	8,123	33,143	226,880	208,117
Missiles	−1,036	643	578	1,271	1,456	16,035	15,691
Ships	9	17	1,640	2,678	4,344	43,984	84,381
Ordnance, vehicles, and related equipment	8,643	1,534	17,707	10,146	38,030	192,738	187,900
Electronics and communications	14,666	670	5,552	4,330	25,218	101,235	94,654
Other procurement	7,128	2,226	2,789	3,786	15,938	88,420	91,313
Total—Procurement	43,542	12,732	31,521	30,334	118,129	669,292	682,056
Research, Development, Test, & Evaluation	—	—	—	10	10	35	49
Military Construction	837	−136	142	23	866	6,809	6,054
Revolving Fund	17,201	5,494	−4,020	3,726	22,401	848,233	797,879
Undistributed	−21,627	−2,367	−1,650	3,736	−21,908	67,472	306
Subtotal—Military Assistance	59,831	34,200	47,503	56,461	197,995	1,823,034	1,713,616
Total—Military Assistance-Bud. Concept adjustments	74,899	35,466	5,294	22,149	137,808	433,454	287,496
Total—Military Assistance	**134,730**	**69,666**	**52,797**	**78,610**	**335,803**	**2,256,488**	**2,001,112**

Obligations

Department of Defense	Available for Obligation	Obligations					Unobligated balance 31 Oct 1968
		July 1968	Aug 1968	Sep 1968	Oct 1968	Cum thru 31 Oct 1968	
Military Personnel							
Active forces	19,582,892	1,787,704	1,747,114	1,750,388	1,768,187	7,053,393	12,529,499
Reserve forces	909,750	121,495	90,129	63,733	65,407	340,764	568,987
Retired pay	2,275,000	188,424	193,380	195,417	197,876	775,097	1,499,903
Total—Military Personnel	22,767,642	2,097,622	2,030,622	2,009,540	2,031,471	8,169,255	14,598,387
Operation and Maintenance	23,524,178	2,273,622	1,990,548	2,240,472	2,308,955	8,813,597	14,710,580
Procurement							
Aircraft	11,440,784	256,542	509,403	1,077,380	534,958	2,378,283	9,062,501
Missiles	4,153,282	433,808	117,880	529,471	238,553	1,319,712	2,833,570
Ships	3,800,643	279,852	109,358	146,364	146,733	682,307	3,118,336
Tracked combat vehicles	530,714	5,083	3,496	72,131	52,774	133,484	397,230
Ordnance, vehicles and related equipment	10,948,327	228,965	1,706,148	1,417,459	1,002,203	4,354,775	6,593,552
Electronics and communications	2,296,494	31,377	145,904	80,555	108,693	366,529	1,929,965
Other procurement	3,401,331	222,937	158,372	211,522	191,121	783,952	2,617,379
Undistributed	−2,014,720	—	—	—	—	—	−2,014,720
Total—Procurement	34,556,855	1,458,561	2,750,565	3,534,879	2,275,038	10,019,043	24,537,812
Research, Development, Test, & Evaluation							
Military sciences	1,135,347	64,613	88,662	99,637	71,499	324,411	810,935
Aircraft	908,689	56,940	153,647	95,984	−9,280	297,291	611,398
Missiles	2,339,913	535,302	240,952	360,246	248,576	1,385,076	954,837
Astronautics	1,296,839	197,905	68,839	98,448	181,883	547,075	749,764
Ships	250,958	113,868	36,707	25,309	21,897	197,781	53,177
Ordnance, vehicles, and related equipment	344,752	28,925	87,688	32,018	20,036	168,667	176,085
Other equipment	961,490	66,874	88,479	91,058	70,070	316,418	645,009
Program-wide management and support	626,772	77,259	85,114	82,553	69,682	314,608	312,164
Emergency Fund	—	—	—	—	—	—	—
Undistributed	1,419,391	—	—	—	—	—	1,419,391
Total—Research, Develop., Test & Eval.	9,284,150	1,141,685	850,090	885,251	674,363	3,551,389	5,732,762
Military Construction	3,858,564	138,756	142,188	202,642	173,972	657,558	3,201,006
Family Housing	730,475	53,081	43,201	71,224	60,655	228,161	502,315
Civil Defense	69,206	3,368	5,142	4,007	3,391	15,908	53,298
Other	71,974	56	9	4	−20	49	71,925
Subtotal—Military Functions	94,863,045	7,166,751	7,812,365	8,948,019	7,527,826	31,454,961	63,408,084
Military Assistance	386,001	71,645	8,894	23,491	12,499	116,529	269,471
Total—Department of Defense	**95,249,046**	**7,238,396**	**7,821,258**	**8,971,510**	**7,540,327**	**31,571,491**	**63,677,555**

Department of the Army

	Available for Obligation	Obligations					Unobligated balance 31 Oct 1968
		July 1968	Aug 1968	Sep 1968	Oct 1968	Cum thru 31 Oct 1968	
Military Personnel							
Active forces	8,103,600	735,831	73,217	712,951	719,484	2,900,883	5,202,717
Reserve forces	593,600	87,019	58,714	33,894	45,921	225,548	368,052
Total—Military Personnel	8,697,200	822,850	791,331	746,845	765,405	3,126,431	5,570,769
Operation and Maintenance	8,904,633	969,854	681,613	661,316	803,769	3,116,552	5,788,081
Procurement							
Aircraft	1,146,592	15,265	208,279	65,342	35,215	324,101	822,491
Missiles	1,018,855	69,424	45,371	344,702	62,900	522,397	496,458
Tracked combat vehicles	500,998	5,114	3,384	65,759	49,918	124,175	376,823
Ordnance, vehicles and related equipment	6,776,730	155,846	851,322	1,053,965	518,346	2,579,479	4,197,251
Electronics and communications	993,050	5,743	80,268	28,565	31,074	145,650	847,400
Other procurement	894,699	19,294	14,581	40,883	38,047	112,805	781,894
Undistributed	−2,082,863	—	—	—	—	—	−2,082,863
Total—Procurement	9,248,061	270,686	1,203,205	1,599,216	735,500	3,808,607	5,439,453
Research, Development, Test, & Evaluation							
Military sciences	204,911	24,178	17,365	13,155	15,618	70,316	134,595
Aircraft	149,892	13,290	16,085	6,696	9,103	45,174	104,718
Missiles	734,496	86,835	57,943	209,061	35,770	389,609	344,887
Astronautics	12,218	152	421	613	609	1,795	10,423
Ordnance, vehicles and related equipment	209,856	27,584	24,493	13,294	11,261	76,632	133,224
Other equipment	468,951	37,551	34,820	20,988	27,708	121,067	347,884
Program-wide management and support	102,150	19,075	7,677	5,990	5,770	38,512	63,638
Undistributed	45,073	—	—	—	—	—	45,073
Total—Research, Develop., Test & Eval.	1,927,547	208,665	158,804	269,797	105,839	743,105	1,184,442
Military Construction	1,862,009	32,920	65,816	81,602	52,169	232,507	1,629,501
Total—Department of the Army	**30,639,450**	**2,304,975**	**2,900,769**	**3,358,776**	**2,462,682**	**11,027,202**	**19,612,247**

Department of the Navy

Military Personnel							
Active forces	5,761,500	517,273	484,340	511,039	515,018	2,027,670	3,733,830
Reserve forces	156,220	17,859	12,330	16,549	9,294	56,032	100,189
Total—Military Personnel	5,917,720	535,132	496,670	527,588	524,312	2,083,702	3,834,018
Operation and Maintenance	6,323,095	369,964	600,950	587,710	889,144	2,447,758	3,875,337
Procurement							
Aircraft	3,546,602	8,541	91,190	163,460	296,795	559,986	2,986,616
Missiles	1,061,285	265,299	24,240	83,302	15,418	388,259	673,026
Ships	3,800,643	279,852	109,358	146,364	146,733	682,307	3,118,336
Tracked combat vehicles	29,716	−31	112	6,372	2,856	9,309	20,407
Ordnance, vehicles and related equipment	2,193,152	39,727	85,463	183,563	297,506	606,259	1,586,893
Electronics and communications	779,492	10,962	23,932	30,589	57,932	123,415	656,077
Other procurement	1,938,754	151,590	102,026	113,177	139,009	505,802	1,432,752
Undistributed	−385,426	—	—	—	—	—	−385,426
Total—Procurement	12,964,216	755,940	436,321	726,826	956,250	2,875,337	10,088,879
Research, Development, Test, & Evaluation							
Military sciences	116,765	21,140	29,075	30,596	16,031	96,842	19,923
Aircraft	220,015	1,576	112,358	5,308	16,064	135,306	84,709
Missiles	549,548	282,806	55,365	89,848	41,049	469,068	80,480
Astronautics	16,699	1,968	4,401	502	3,806	10,677	6,022
Ships	250,958	113,868	36,707	25,309	21,897	197,781	53,177
Ordnance, vehicles and related equipment	134,896	1,341	63,195	18,724	8,775	92,035	42,861
Other equipment	101,701	12,719	17,959	23,649	15,871	70,198	31,503
Program-wide management and support	242,055	11,995	53,255	50,137	42,117	157,504	84,551
Undistributed	1,289,473	—	—	—	—	—	1,289,473
Total—Research, Develop., Test & Eval.	2,922,110	447,413	372,315	244,073	165,610	1,229,411	1,692,698
Military Construction	1,304,531	49,150	66,162	87,426	90,006	292,744	1,011,787
Total—Department of the Navy	**29,431,671**	**2,157,588**	**1,972,419**	**2,173,623**	**2,625,322**	**8,928,952**	**20,502,719**

Department of the Air Force	Available for Obligation	Obligations					Unobligated balance 31 Oct 1968
		July 1968	Aug 1968	Sep 1968	Oct 1968	Cum thru 31 Oct 1968	
Military Personnel							
Active forces	5,717,792	534,600	530,157	526,398	533,685	2,124,840	3,592,952
Reserve forces	159,930	16,617	19,085	13,290	10,192	59,184	100,746
Total—Military Personnel	5,877,722	551,216	549,243	539,688	543,878	2,184,025	3,693,697
Operation and Maintenance	7,165,247	822,997	612,069	901,765	511,528	2,848,359	4,316,889
Procurement							
Aircraft	6,747,590	232,736	209,934	848,578	202,948	1,494,196	5,253,394
Missiles	2,073,142	99,082	48,272	101,467	160,235	409,056	1,664,086
Ships	—	—	—	—	—	—	—
Ordnance, vehicles and related equipment	1,975,471	33,326	768,574	179,920	185,935	1,167,755	807,716
Electronics and communications	513,949	14,401	41,488	21,056	19,563	96,508	417,441
Other procurement	476,888	51,077	39,976	48,862	12,380	152,295	324,593
Undistributed	428,971	—	—	—	—	—	428,971
Total—Procurement	12,216,013	430,622	1,108,245	1,199,881	581,064	3,319,812	8,896,202
Research, Development, Test, & Evaluation							
Military sciences	195,209	9,028	13,336	27,533	13,437	63,334	131,875
Aircraft	538,782	42,074	25,204	83,980	−34,447	116,811	421,971
Missiles	1,055,869	165,661	127,644	61,337	171,757	526,399	529,470
Astronautics	1,267,922	195,785	64,017	97,333	177,468	534,603	733,319
Other equipment	390,838	16,604	35,700	46,421	26,491	125,216	265,622
Program-wide management and support	282,567	46,189	24,182	26,426	21,795	118,592	163,975
Undistributed	84,845	—	—	—	—	—	84,845
Total—Research, Develop., Test & Eval.	3,816,032	475,342	290,082	343,029	376,500	1,484,953	2,331,079
Military Construction	573,835	55,692	9,475	33,578	31,806	130,552	443,283
Total—Department of tbe Air Force	**29,648,851**	**2,335,869**	**2,569,114**	**3,017,942**	**2,044,775**	**9,967,700**	**19,681,150**

Defense Agencies/Office of the Secretary of Defense

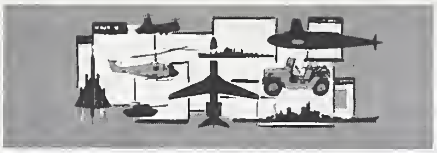
Military Personnel							
Retired Pay	2,275,000	188,424	193,379	195,418	197,876	775,097	1,499,903
Operation and Maintenance	1,131,202	110,818	95,916	89,680	104,515	400,929	730,273
Procurement							
Ordnance, vehicles and related equipment	2,974	66	789	11	416	1,282	1,692
Electronics and communications	10,003	271	216	345	124	956	9,047
Other procurement	90,990	976	1,789	8,600	1,685	13,050	77,940
Undistributed	24,598	—	—	—	—	—	24,598
Total—Procurement	128,565	1,313	2,794	8,956	2,224	15,287	113,278
Research, Development, Test, & Evaluation							
Military sciences	618,462	10,267	28,886	28,353	26,413	93,919	524,542
Emergency Fund	—	—	—	—	—	—	—
Undistributed	—	—	—	—	—	—	—
Total—Research, Develop., Test & Eval.	618,462	10,267	28,886	28,353	26,413	93,919	524,542
Military Construction	118,190	993	735	36	−9	1,755	116,434
Family Housing	730,475	53,081	43,201	71,224	60,655	228,161	502,315
Other	71,974	56	9	4	−20	49	71,925
Total—Defense Agencies-OSD	**5,073,868**	**364,952**	**364,920**	**393,670**	**391,656**	**1,515,198**	**3,558,670**

Office of Civil Defense

Civil Defense	69,206	3,368	5,142	4,007	3,391	15,908	53,298

Military Assistance

Military Personnel	78	15	37	—	26	78	—
Operation and Maintenance	344,492	34,388	12,732	18,265	9,788	75,173	269,319
Procurement							
Aircraft	11,035	−38,408	46,294	2,054	1,095	11,035	—
Missiles	1,351	−808	1,643	755	−282	1,308	43
Ships	1,725	1,670	11	−119	112	1,674	51
Ordnance, vehicles and related equipment	14,983	10,349	1,276	704	2,654	14,983	—
Electronics and communications	6,219	5,225	569	913	−504	6,203	16
Other procurement	5,880	3,068	2,236	921	−356	5,869	11
Total—Procurement	41,193	−18,904	52,029	5,228	2,719	41,072	121
Research, Development, Test, & Evaluation	—	—	—	—	−27	−27	27
Military Construction	160	−72	232	—	—	160	
Undistributed	76	56,216	−56,134	−3	−5	74	2
Total—Military Assistance	**386,001**	**71,645**	**8,894**	**23,491**	**12,499**	**116,529**	**269,471**



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of February 1969:

DEFENSE SUPPLY AGENCY

5—**Delta Petroleum Co.**, New Orleans, La. $1,067,091. 2,795,750 gallons of engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va. DSA 640–69–D–1329 MOD P001.

—**Allis Chalmers Mfg. Co.**, Milwaukee, Wis. $1,167,115. Gasoline-fuel, forklift trucks. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4167.

10—**Eastman Kodak Co.**, Rochester, N.Y. $1,001,211. 17,401 rolls and 32 cases of aerial motion picture film. Defense General Supply Center, Richmond, Va. DSA 400–69–D–0046.

11—**Glenn's All American Sportswear**, Amory, Miss. $1,257,131. 466,520 pairs of men's cotton wind-resistant poplin trousers. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1405.

—**Dale Fashions, Inc.**, Vineland, N.J. $1,130,572. 79,632 men's wool peacoats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1448.

12—**Aluminum Co. of America**, Pittsburgh, Pa. $17,247,388. 56,703,600 lbs. of aluminum powder. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4307.

—**Alcan Metal Powders**, Elizabeth, N.J. $3,099,209. 9,861,000 lbs. of aluminum powder. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4308.

—**Valley Metallurgical Processing Co.**, Essex, Conn. $1,780,680. 6,000,000 lbs. of aluminum powder. Defense General Supply Center, Richmond, Va.

13—**Burlington Industries**, New York, N.Y. $3,361,200. 4,000,000 yards of ripstop cotton. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1478.

—**Tanenbaum Textile Co.**, New York, N.Y. $3,584,190. 4,000,000 yards of ripstop cotton. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1479.

—**Dan River Mills**, Danville, Va. $1,845,580. 2,200,000 yards of ripstop cotton. Defense Personnel Support Center, Philadephia, Pa. DSA 100–69–C–1480.

—J. P. Stevens & Co., New York, N.Y. $2,934,421. 3,350,000 yards of ripstop cotton. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1481.

—**Burlington Industries**, New York, N.Y. $1,252,200. 1,500,000 yards of ripstop cotton. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1482.

17—**Valley Metallurgical Processing Co.**, Essex, Conn. $2,403,115. 3,612,500 lbs. of magnesium powder. Defense General Supply Center, Richmond, Va. DSA 400–69–C–4420.

18—**M. L. W. Corp.**, Bayamon, Puerto Rico. $1,029,129. 428,804 pairs of men's wind-resistant cotton poplin trousers. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1503.

20—The following contracts for aviation gasoline have been awarded by the Defense Fuel Supply Center, Alexandria, Va:

Standard Oil Co., San Francisco, Calif. $5,122,788. 33,540,000 gallons. DSA 600–69–D–1441.

Sinclair Oil Corp., New York, N.Y. $5,686,114. 44,140,000 gallons. DSA 600–69–D–1440.

Mobil Oil Corp., New York, N.Y. $23,100,092. 167,943,000 gallons. DSA 600–69–D–1437.

Cities Service Oil Co., New York, N.Y. $14,036,005. 109,200,000 gallons. DSA 600–69–D–1432.

Gulf Oil Corp., New York, N.Y. $1,225,725. 8,850,000 gallons. DSA 600–69–D–1435.

Atlantic Richfield Co., Los Angeles, Calif. $5,167,680. 33,600,000 gallons. DSA 600–69–D–1430.

American Oil Co., Chicago, Ill. $1,610,460. 10,587,000 gallons. DSA 600–69–D–1429.

Chevron Oil Co., Denver, Colo. $1,628,425. 11,270,000 gallons. DSA 600–69–D–1431.

Humble Oil & Refining Co., Houston, Tex. $17,995,535. 129,654,590 gallons. DSA 600–69–D–1436.

Phillips Petroleum Co., Bartlesville, Okla. $21,601,878. 150,905,000 gallons. DSA 600–69–D–1438.

Shell Oil Co., New York, N.Y. $3,971,716. 26,940,000 gallons. DSA 600–69–D–1439.

—The following contracts for combat boots have been awarded by the Defense Personnel Support Center, Philadelphia, Pa:

Addison Shoe Corp., Wynne, Ark. $2,719,610. 325,212 pairs. DSA 100–69–C–1546.

Endicott Johnson Corp., Endicott, N.Y. $2,570,400. 315,000 pairs. DSA 100–69–C–1547.

Sportwelt Shoe Co., Nashua, N.H. $2,152,445. 240,000 pairs. DSA 100–69–C–1548.

Safety First Shoe Co., Nashville, Tenn. $3,472,000. 400,000 pairs. DSA 100–69–C–1549.

Hi-Pals Footwear, Inc., Waynesville, N.C. $2,620,699. 311,988 pairs. DSA 100–69–C–1550.

24—Shell Oil Co., New York, N.Y. $3,693,704. 2,562,000 barrels of number six fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–1367.

—J. P. Stevens & Co., New York, N.Y. $2,586,870. 737,000 linear yards of wool serge cloth. Defense Personnel Supply Center, Philadelphia, Pa. DSA 100–69–C–1474.

—**Burlington Industries, Inc.**, New York, N.Y. $1,242,790. 589,000 linear yards of tropical wool and polyester cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1477.

25—B. G. Colten & Co., New York, N.Y. $1,297,740. 794,000 yards of wind-resistant oxford cotton cloth. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–1553.

27—Gulf Oil Co., Houston, Tex. $2,634,066. 586,255 barrels of diesel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–1358.

—**Humble Oil & Refining Co.**, Houston, Tex. $1,001,960. 40,000 barrels of number six fuel oil and 422,000 barrels of Navy Special fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–1360.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company—Value—Material or Work to be Performed—Location of Work Performed (outside company plant)—Contracting Agency—Contract Number.

DEPARTMENT OF THE ARMY

3—**Bell & Howell Co.**, Chicago, Ill. $2,302,020. Fuzes for 81mm projectiles. Army Procurement Agency, Chicago, Ill. DA AA09–69–C–0005.

—**Amron Corp.**, Waukesha, Wis., $1,580,056. Metal parts for high explosive 20mm projectiles. Frankford Arsenal, Philadelphia, Pa. DA AA25–69–C–0347.

—General Motors, Cleveland, Ohio. $11,600,000 (contract modification). 155mm self-propelled, medium howitzers (M109). Army Weapons Command, Rock Island, Ill. DA 11–199–AMC–00610 (W).

4—Emerson Electric Co., St. Louis, Mo. $1,470,000. XM28 armament sub-systems for helicopters. Army Weapons Command, Rock Island, Ill. DA AF03–69–C–0058.

5—**AVCO Corp.**, Richmond, Ind. $2,016,900. Metal parts for fuzes for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0158.

—Lockheed Aircraft, Sunnyvale, Calif. $2,627,843. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Seattle, Wash., Sunnyvale, Calif. and the Nevada Test Site. Defense Atomic Support Agency. DASA–01–69–C–0060.

6—**Zenith Radio Corp.**, Chicago, Ill. $2,120,250 (contract modification). Metal parts for fuzes for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0033.

—**American Fabricated Products Co.**, Indianapolis, Ind. $1,004,260 (contract modification). Fin assemblies (M149) for 81mm mortars. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0298.

—United Metal Cabinet Corp., Pottsville, Pa. $1,637,804. Shipping and storage containers for 20mm cartridges. Frankford Arsenal, Philadelphia, Pa. DA AA25–69–C–0352.

—City of Kaw, Okla. $1,355,000. Relocation of municipal facilities at the Kaw Dam and Reservoir Project. Engineer Dist., Tulsa, Okla. DA CW56–69–C–0055.

7—**Ingraham Industries**, Bristol, Conn. $3,588,951. M564 MTSQ and M556 MT artillery fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0351.

—**Supreme Products Corp.**, Chicago, Ill. $1,436,000 (contract modification). Bomb tail fuzes. Army Procurement Agency, Chicago, Ill. DA AA09–69–C–0074.

10—Dorsett Electronics Co., Tulsa, Okla. $1,521,593. Receivers, detectors, intrusion detection sets and related manuals. Mobility Equipment Research & Development Center, Fort Belvoir, Va. DA AK02–69–C–0355.

—**M. Dyson Building Co.**, Battles Wharf, Ala. $1,355,480. Construction of a student dormitory with consolidated mess and fallout shelter. Fort Rucker, Ala. Engineer Dist., Mobile, Ala. DA CA01–69–C–0031.

—**Wells Marine, Inc.**, Costa Mesa, Calif. $2,239,830. Delay plungers used with point detonating fuzes. Army Procurement Agency, Chicago, Ill. DA AA09–69–C–0197.

11—Boeing Co., Morton, Pa. $1,864,800. Rotary wing heads for CH–47 Chinook helicopters. Aviation Systems Command, St. Louis, Mo. DA AJ01–68–A–0005.

—**Bell & Howell Co.**, Chicago, Ill. $2,684,405 (contract modification). Bomblet fuzes. Evanston, Ill. Army Procurement Agency, Chicago, Ill. DA AA09–69–C–0142.

12—Gichner Mobile Systems, Dallastown, Pa. $2,495,209. Electrical equipment shelters. Electronics Command, Philadelphia, Pa. DA AB05–69–C–0119.

13—**Donovan Construction Co.**, New Brighton, Minn. $10,947,000. Metal parts for 155mm high explosive projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0036.

—**Penland Paper Converter Corp.**, Texarkana, Tex. $1,180,641. Fiber containers for 4.2-inch mortars. Army Procurement Agency, Chicago, Ill. DA AG11–69–C–0491.

14—**Hughes Tool Co.**, Culver City, Calif. $1,042,800. Disassembly, inspection and repair of crash-damaged OH–6A helicopters. El Segundo, Calif. Aviation Systems Command, St. Louis, Mo. DA AJ01–68–A–0017.

—RCA, Burlington, Mass. $2,380,000. Engineering services for land combat support systems (an automated testing facility for field testing of surface-to-surface missiles). Army Missile Command, Huntsville, Ala. DA AH01–69–C–1144.

—**Unidynamics**, Goodyear, Ariz. $2,129,400. 81mm illuminating projectiles. Army Procurement Agency, Pasadena, Calif. DA AA09–69–C–0096.

—**Philco-Ford Corp.**, Anaheim, Calif. $1,124,992 (contract modification) 30mm guns (XM140) for AH–56A Cheyenne helicopters. Army Weapons Command, Rock Island, Ill. DA AF03–69–C–0033.

—**Raytheon Co.**, Andover, Mass. $1,139,696. (contract modification) Engineering services for the Hawk missile system. Army Missile Command, Huntsville, Ala. DA AH01–69–C–0384.

—**Goodyear Tire & Rubber Co.**, Akron, Ohio. $1,384,962. Track shoe assemblies (T138) for armored reconnaissance airborne assault vehicles. St. Mary's, Ohio. Tank Automotive Command, Warren, Mich. DA AE07–69–C–2519.

—**Clevite Corp.**, Cleveland, Ohio. $1,116,916. T53 engine seals for UH–1 helicopters. Army Procurement Agency, Los Angeles, Calif. DA AG07–69–C–0053.

—**Southern Airways Co.**, Sylacauga, Ala. $7,795,260. Metal parts for 155mm high explosive projectiles (M107). Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0330.

17—**Norris Industries**, Vernon, Calif. $2,238,000. Metal parts for 152mm projectiles. Picatinny Arsenal, Dover, N.J. DA AA21–69–C–0462.

18—**Ordnance Products**, Northeast, Md. $1,150,906. Fuzes for hand grenades. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0368.

—**Bulova Watch Co.**, Jackson Heights, N.Y. $1,213,539 (contract modification). Metal parts for 2.75-inch rocket fuzes. Woodside, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0175.

19—**K.D.I. Precision Products, Inc.**, Cincinnati, Ohio. $2,629,125. Metal parts for 2.75-inch rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0196.

—**Uniroyal, Inc.**, New York, N.Y. $7,439,459 (contract modification). Manufacture of explosives; loading, assembling and packing of 105mm and 8-inch projectiles; and for support activities at the Army Ammunition Plant, Joliet, Ill. Ammuniiton Procurement & Supply Agency, Joliet, Ill. DA 11–173–AMC–00062 (A).

—**Bell Aerospace Corp.**, Buffalo, N.Y. $1,077,000 (contract modification). Distance Measuring Subsystem for a visual airborne target locater system. Electronics Command, Fort Monmouth, N.J. DA 28–043–AMC–0014 (E).

—**General Electric**, Burlington, Vt. $3,229,970. 20mm automatic guns (M61A1) and pods. Army Weapons Command, Rock Island, Ill. DA AF03–69–C–0027.

—**Electromagnetic Technology Corp.**, Montgomeryville, Pa. $9,845,628. AN/VPS–2 radar sets, installation kits, and miscellaneous repair parts for the Vulcan Air Defense System. Frankford Arsenal, Philadelphia, Pa. DA AA25–69–C–0380.

20—**Mason & Hanger, Silas Mason Co.**, New York, N.Y. $7,016,389 (contract modification). Loading, assembling and packing ammunition, and for support services at the Army Ammunition Plant, Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0468.

—**AVCO Corp.**, Richmond, Ind. $1,218,293. Metal parts for 40mm high explosive projectiles. Army Procurement Agency, Cincinnati, Ohio. DA AA09–69–C–0131.

—**Ralph Meyers Contracting Corp.**, Salem, Ind. $4,192,323. Construction excavation work at the Athens, Ohio, Flood Protection Project. Engineer Dist., Huntington, W. Va. DA CW69–69–C–0053.

—**International Harvester Co.**, San Diego, Calif. $1,232,749. Nine 1,100 HP gas turbines and pump assemblies with accessories. Engineer Dist., San Francisco, Calif. DA CA07–69–C–0044.

—**Amron Corp.**, Waukesha, Wis. $1,186,426 (contract modification). Metal parts for 40mm projectiles. Army Procurement Agency, Chicago, Ill. DA AA09–69–C–0244.

24—**Thiokol Chemical Corp.**, Bristol, Pa. $3,642,801 (contract modification). Loading, assembling and packing mortar propellants, igniters, flares and ammunition components. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 11–173–AMC–00200 (A).

—**Philco-Ford Corp.**, Newport Beach, Calif. $2,036,885. 209 sets of spare parts for the Shillelagh missile system. Army Procurement Agency, Pasadena, Calif. DA AH01–68–A–0034.

—**Gocorp, Inc.**, Adrian, Mich. $2,579,868. Track shoe assemblies for M113 personnel carriers. Tank Automotive Command, Warren, Mich. DA AE07–69–C–2745.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,404,214. Road wheel disc assemblies for M48 combat tanks. Tank Automotive Command, Warren, Mich. DA AE07–69–C–2734.

—**Amron Corp.**, Waukesha, Wis. $3,865,050. Metal parts for cartridge cases (M118), and base plugs and cups for 40mm cartridges (M406). Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0044.

—**Bauer Ordnance Co.**, Detroit, Mich. $1,899,631 (contract modification). Bayonets for M16A1 rifles. Army Arsenal, Rock Island, Ill. DA AF01–69–C–0224.
DA AF01–69–C–0224.

25—**W. W. Clyde Co.**, Salt Lake City, Utah. $1,070,798. Construction of a paved extension to an existing runway; blast pad and overruns at each end of the runway and a concrete decontaminaiton pad with connecting taxiways and necessary lighting. Dugway Proving Ground, Utah. Engineer Dist., Sacramento, Calif. DA CA05–69–0061.

—**Skyline Industries**, Fort Worth, Tex. $2,127,070. M1A2 demolition kits. Army Procurement Agency, Cincinnati, Ohio. DA AG–69–C–0440.

—**Bell Aerosystems Co.**, Buffalo, N.Y. $2,180,676. Design, development and delivery of three prototype surveillance systems for the Huey Cobra helicopter. Army Weapons Command, Rock Island, Ill. DA AF03–69–C–0064.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $1,179,000 (contract modification). Remodernization of nine OV–1A Mohawk aircraft. Stuart, Fla. and Bethpage, N.Y. Aviation Systems Command, St. Louis, Mo. DA AJ01–68–C–1561. (K).

—**AVCO Corp.**, Stratford, Conn. $12,663,600 (contract modification). T53L13A and T53L701 engines for use on Huey, Cobra and Mohawk aircraft. Aviation Systems Command, St. Louis, Mo. DA AJ01–68–C–1874.

26—**Honeywell, Inc.**, Hopkins, Minn. $5,357,340 (contract modification). Grenade fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–68–C–0490.

—**Pace Corp.**, Memphis, Tenn. $1,159,259 (contract modification). Two-second delay photoflash cartridges (M123A1). East Camden, Ark. and Memphis, Tenn. Picatinny Arsenal, Dover, N.J. DA AA21–69–C–0863.

—**Amron Corp.**, Waukesha, Wis. $6,966,628. 20mm brass cartridge cases (M103). Frankford Arsenal, Philadelphia, Pa. DA AA25–69–C–0202.

—**Sanders Associates**, Bedford, Mass. $2,206,171. Engineering services for the Forward Area Alert Radar system. Army Missile Command, Huntsville, Ala. DA AH01–69–C–1241.

27—**Western Electric**, New York, N.Y. $9,481,500. Modification kits for the Nike Hercules missile system. Burlington, N.C. Army Missile Command, Huntsville, Ala. DA AH01–69–C–1125.

—**Action Mfg. Co.**, Philadelphia, Pa. $1,248,896. Metal parts for fuzes for 81mm projectiles. Army Procurement Agency, Cincinnati, Ohio. DA AA09–69–C–0246.

—**Sanders Associates**, Bedford, Mass. $7,102,133. Components and test equipment for the Forward Area Alert Radar system. Army Missile Command, Huntsville, Ala. DA AH01–69–C–0749.

—**Vinnell Corp. and Hyun-Dea Construction Co.**, Alhambra, Calif. $1,127,164. Construction of concrete covers and end wall for aircraft shelters. Kwang-ju, Suwon and Taegu Air Bases in Korea. Engineer Dist., Far East. DA CA81–69–C–0015.

28—**Litton Systems**, Woodland Hills, Calif. $4,661,510. AN/ASN–86 inertial navigational systems, auxiliary items and test sets. Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0345.

—**Motorola, Inc.**, Scottsdale, Ariz. $2,597,000 (contract modification). Test equipment and ancillary items for radar surveillance sets (AN/APS–940). Electronics Command, Fort Monmouth, N.J. DA AB07–68–C–0419.

—**University of Illinois**, Urbana, Ill. $1,678,000 (contract modification). Research of electronic and plasma technology for development of techniques for military application. Electronics Command, Fort Monmouth, N.J. DA AB07–67–C–0199.

—**Magline, Inc.**, Pinconning, Mich. $1,153,100. Electrical equipment shelters. Electronics Command, Fort Monmouth, N.J. DA AB05–69–C–0114.

—**Kollett Aircraft Corp.**, Willow Grove, Pa. $1,742,004 (contract modification). Portable, self-contained photographic labs. Electronics Command, Fort Monmouth, N.J. DA AB05–68–C–1225.

—**Chamberlain Mfg. Corp.**, New Bedford, Mass. $3,695,052. Metal parts for 155mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0377.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $1,324,350 (contract modification). 60mm illuminating projectiles (M83A3). Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0051.

—**Olin Mathieson Chemical Corp.**, New York, N.Y. $1,953,877 (contract modification). Production of explosives, support services and operation of the Army Ammunition Plant, Charlestown, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0148.

—**Eastman Kodak Co.**, Kingsport, Tenn. $5,742,742 (contract modification). Production of explosives, support services and operation of the Holston Army Ammunition Plant, Kingsport, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 11–173–AMC–35 (A).

—**Hercules, Inc.**, Wilmington, Del. $10,823,293 (contract modification). Production of explosives, support services and operation of the Army Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 11–173–AMC–37 (A).

—**FMC Corp.**, Santa Clara, Calif. $3,422,781. Fabrication and assembly of 152mm canisters (XM–626). Picatinny Arsenal, Dover, N.J. DA AA21–69–C–0303.

—**John R. Hollingsworth Co.**, Phoenixville, Pa. $1,055,470. 7.5 kw generator sets. Mobility Equipment Command, St. Louis, Mo. DA AK01–69–C–6628.

—**Texas Instruments, Inc.**, Dallas, Tex. $1,040,000 (contract modification). Classified work. Dallas and Sherman, Tex. Mobility Equipment Research & Development Center, Fort Belvoir, Va. DA AK02–69–C–0541.

—**Hercules Engines**, Canton, Ohio. $1,958,451. Multifuel engine assemblies for 2½-ton trucks. Tank Automotive Command, Warren, Mich. DA AE06–68–C–0006.

—**Mine Safety Appliances Co.**, Pittsburgh, Pa. $2,415,585. XM28E4 riot control masks, spare parts, and test equipment. Edgewood Arsenal, Md. DA AA15–68–C–0486.

DEPARTMENT OF THE NAVY

3—**Westinghouse Electric**, Baltimore, Md. $9,783,579 (contract modification). AN/APG–59 radar sets. Naval Air Systems Command. N00019–68–C–0570.

—**Montgomery Ross Fisher, Inc.**, Los Angeles, Calif. $2,320,000. Construction of enlisted men's barracks at the San Francisco Bay Naval Shipyard, Hunters Point, Calif. Western Div., Naval Facilities Engineering Command, San Bruno, Calif. N62474–67–C–0735.

—**American Electric Contracting Corp.**, La Mesa, Calif. $1,288,000. Construction of Pier Three utilities at the San Diego Naval Station. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif. N62474–69–C–0035.

—**Systems Research Corp.**, Washington, D.C. $1,039,300. Continuation of the preparation for the Navy's DXGN ship acquisition plan. Naval Ship Systems Command. N00024–69–C–0258.

4—**Talley Industries, Inc.**, Mesa, Ariz. $7,696,644. LAU–3/A rocket launchers. Naval Air Systems Command. N00019–69–C–0455.

—**Varo, Inc.**, Garland, Tex. $6,996,300. LAU–

3/A rocket launchers. Naval Air Systems Command. N00019–69–C–0454.

5—**McDonnell Douglas Corp.**, St. Louis, Mo. $33,500,000 (contract modification). Long lead time effort and materials for RF–4C and F–4E aircraft. Naval Air Systems Command. N00019–69–C–0495.

—**General Dynamics**, Pomona, Calif. $7,125,430 (contract modification). Research and development on the Standard Arm Missile. Naval Air Systems Command. N00019–68–C–0400.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $4,580,000 (contract modification). Increase funding for long lead time effort for A–6A aircraft. Naval Air Systems Command. NOw 66–0058.

—**Raytheon Co.**, Lexington, Mass. $1,328,010 (contract modification). Sparrow III missile guidance and control groups. Lowell, Mass. Naval Air Systems Command. N00019–68–C–0025.

6—**Whittaker Corp.**, Saugus, Calif. $11,488,000. Aircraft parachute flares (MK N K 45, Mod O). Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0227.

—**U.S. Steel**, Pittsburgh, Pa. $11,074,800. MK 81, Mod 1, bomb bodies. McKeesport, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0243.

—**McDonnell Douglas Corp.**, St. Louis, Mo. $7,400,000 (contract modification). Increase in the funding for long lead time effort and materials to support procurement of RF–4E aircraft. Naval Air Systems Command. N00019–68–C–0495.

—**Geismer & Mitchell Co.**, Jacksonville, Fla. $1,931,000. Rehabilitation of barracks and mess halls at the Naval Air Station, Cecil Field, Fla. Naval Facilities Engineering Command. N62467–67–C–0559.

—**G. L. Cory, Inc.**, San Diego, Calif. $1,209,936. Construction of an aircraft maintenance hanger at the Naval Air Station, Imperial Beach, Calif. Naval Facilities Engineering Command. N62473–69–C–0133.

—**Maxon Electronics Corp.**, Macon, Ga. $1,162,866. Impulse cartridge (MK 2, MOD O & MK9, MOD O). Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0261.

—**Kilgore Corp.**, Toone, Tenn. $1,022,197. MK 25, MOD 3, marine markers. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0216.

7—**McDonnell Douglas Corp.**, Long Beach, Calif. $1,900,000 (contract modification). Increase in funding for long lead time effort to support FY 1969 production of A–4K and TA–4K aircraft. Naval Air Systems Command. N00019–67–C–0170.

—**Bendix Corp.**, Baltimore, Md. $3,007,278 (contract modification). Increase in the limitation of authorization for airbrone receiver transmitters and associated equipment. Naval Air Systems Command. NOw 66–0637.

—**Sanders Associates**, Nashua, N.H. $1,725,041 (contract modification). Increase in the limitation of authorization for airborne receiver transmitters and associated equipment. Naval Air Systems Command. N00019–68–C–0630.

—**Triple A Machine Shop**, San Francisco, Calif. $1,080,349. Topside repairs and alterations on the amphibious transport dock USS Vancouver (LPD-2). Superviser of Shipbuilding, Conversion, and Repair, Twelfth Naval Dist., San Francisco, Calif. N623683–67–C–0012.

10—**Worthington Corp.**, Harrison, N.J. $3,484,200. Steam turbine generator sets, associated technical data and support items. Wellsville, N.Y. Naval Ship Systems Command. N00024–69–C–5347.

—**General Electric**, Syracuse, N.Y. $2,229,998 (contract modification). Manufacture of three AN/TPQ–10 radar course directing centrals. Naval Electronic Systems Command. N00039–68–C–0530.

—**Raytheon Co.**, Lexington, Mass. $2,000,000. Test and evaluation program to modify AN/SPG–51D radar sets. Bedford, Mass. Naval Ordnance Systems Command. N00017–69–C–2407.

11—**McDonnell Douglas Corp.**, Long Beach, Calif. $2,209,500. Strut assemblies for A–3 aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–68–A–3200–0682.

—**Horne Bros.**, Newport News, Va. $1,579,313. Topside regular overhaul of the dock landing ship USS Hermitage (LSD–34). Supervisor of Shipbuilding, Conversion and Repair, Fifth Naval Dist., Norfolk, Va. N62678–69–B–98.

—**Arrowsmith Tool & Mfg. Corp.**, Los Angeles, Calif. $1,110,250. Fabrication of experimental and developmental models of ordnance items and ordnance related end products. Ridgecrest, Calif. Navy Purchasing Office, Los Angeles, Calif. N00123–69–C–0685.

12—**North American Rockwell Corp.**, Columbus, Ohio. $1,800,000. Evaluation of the feasibility of an improved target marking and light armament system for OV–10A aircraft. Naval Air Systems Command. N00019–69–C–0445.

—**RCA**, Princeton, N.J. $1,540,508 (contract modification). Exploratory and developmental work on a communications project. Naval Electronic Systems Command. N00039–68–C–1518.

13—**Johns Hopkins University, Applied Physics Laboratory**, Silver Spring, Md. $1,514,120. Increased research and development work on Project Bumblebee. Naval Ordnance Systems Command. NOw 62–0604.

—**Gibbs Mfg. & Research Corp.**, Janesville, Wis. $3,488,475. MK 346 bomb fuzes. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0231.

14—**General Electric**, Washington, D.C. $1,250,000. Two gas turbine engines and installation and test aboard ship. Naval Ship Systems Command. N00024–69–C–5331.

17—**Honeywell, Inc.**, St. Petersburg, Fla. $7,[illegible]. Inertial components for Poseidon missiles. Strategic Systems Project Office. N00030–69–C–0084.

—**General Time Corp.**, LaSalle, Ill. $2,614,180. Mechanical time fuzes (MK 342, MOD O) for five-inch gun ammunition. Peru, Ill. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0247.

—**Genge Industries**, Oxnard, Calif. $1,957,785. Drafting, technical writing and illustrating work for the Naval Weapons Center, China Lake, Calif. Ridgecrest, Calif. Navy Purchasing Office, Los Angeles, Calif. N00123–69–C–0031.

—**Trepte Construction Co.**, San Diego, Calif. $1,668,730. Construction of boat repair facilities at the Naval Amphibious Base, Coronado, Calif. Naval Facilities Engineering Command. N62473–68–C–0114.

18—**Honeywell, Inc.**, Hopkins, Minn. $51,347,202. Production of MK 46, MOD 1, torpedoes. Naval Ordnance Systems Command. N00017–69–C–1307.

—**Johns Hopkins University, Applied Physics Laboratory**, Silver Spring, Md. $7,043,168 (contract modification). Increased research and development on Project Bumblebee. Naval Ordnance Systems Command. NOw 62–0604C.

19—**Litton Systems**, Woodland Hills, Calif. $1,084,100. Inertial navigation systems and associated equipment. Naval Air Systems Command. N00019–69–C–0451.

—**LTV Aerospace Corp.**, Dallas, Tex. $6,245,364 (contract modification). Changes to extend the service life of F–8A/B and C aircraft. Naval Air Systems Command. N00019–68–C–0191.

20—**General Electric**, Schenectady, N.Y. $8,738,000. Design and furnishing of Navy nuclear propulsion components. Naval Ship Systems Command. N00024–69–C–5154.

—**Scripps Institution of Oceanography**, La Jolla, Calif. $3,041,687. Oceanographic research. Office of Naval Research.

—**Sperry Rand Corp.**, St. Paul, Minn. $1,670,390. Computer components, spare parts, and engineering services. Naval Ship Systems Command. N00024–69–C–1137.

—**Sperry Rand Corp.**, St. Paul, Minn. $1,067,758. A study of the combat system of the nuclear guided missile destroyer (DXGN). Naval Ship Systems Command. N00024–69–C–1233.

24—**Sperry Rand Corp.**, St. Paul, Minn. $3,179,630. Services, material for maintenance, design, development, production and delivery of computer programs for YP–3C/T–3C anti-submarine warfare avionics systems and VP–ANEW avionics. Johnsville, Pa. and St. Paul, Minn. Naval Air Development Center, Johnsville, Pa. N62269–69–C–0187.

—**Curtiss Wright Corp.**, Wood-Ridge, N.J. $1,705,550. J65 engines used in A–4A, B and C aircraft. Aviation Supply Office, Philadelphia, Pa. F41608–69–A–0057–GB54.

26—**General Precision Systems**, Little Falls, N.J. $2,500,000. Support equipment for AN/ASN–90 inertial measurement systems used on A–7E aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–68–A–3201–0111.

—**Norfolk Shipbuilding & Drydock Co.**, Norfolk, Va. $1,233,000. Regular topside overhaul of the dock landing ship USS San Marcos (LSD–25). Supervisor of Shipbuilding, Conversion and Repair, Fifth Naval Dist., Norfolk, Va. IFB N62678–69–B–27.

—**M.I.T., Cambridge, Mass.** $2,210,000. Research on Poseidon guidance systems. Strategic Systems Project Office. N00030–69–C–0089.

27—**LTV Aerospace Corp., Dallas, Tex.** $211,459,083 (contract modification). A–7E aircraft; $27,528,986 contract modification. A–7D aircraft. Naval Air Systems Command. N00019–68–C–0075. N00019–68–C–0143.

—**United Aircraft, Hartford, Conn.** $31,253,457 (contract modification). J52–P–8A engines. Naval Air Systems Command. N00019–67–C–0182.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $7,600,000 (contract modification). Long lead time effort and materials for FY 1970 Procurement of EA–68 Aircraft. Naval Air Systems Command N00019–67–C–0078.

—**General Electric**, West Lynn, Mass. $5,800,000 (contract modification). Engineering development of TF–34 turbofan engines for VSX aircraft. Naval Air Systems Command. N00019–68–C–0443.

—**Boeing Co.**, Morton, Pa. $5,242,000 (contract modification). Increased funding and extension of long lead time for CH–46D helicopters. Naval Air Systems Command. N00019–68–C–0391.

—**North American Rockwell Corp.**, Columbus, Ohio. $2,450,000 (contract modification). Design, development, fabrication and test of a naval intelligence processing system. Naval Air Systems Command. N00019–68–C–0525.

—**Westinghouse Electric Corp.**, Baltimore, Md. $2,450,000 (contract modification). Modification kits for the AN/APG–59 radar to incorporate a digital computer to replace existing analog computers. Naval Air Systems Command. N00019–69–C–0064.

—**Sylvania Electric Products**, Mountain View, Calif. $1,558,252 (contract modification). Electronic counter-measure systems for EA–3B aircraft. Mountain View and Santa Cruz, Calif. Naval Air Systems Command. N00019–68–C–0499.

—**Singer-General Precision, Inc.**, Wayne, N.J. $1,700,000. Research on Poseidon guidance systems. Strategic Systems Project Office. N00030–69–C–0086.

—**Lormack Corp.**, Upper Marlboro, Ma. $1,152,000. Construction of a dispensary and dental clinic at Bolling AFB, Washington, D.C. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C. N62477–67–B–0926.

28—**United Aircraft**, Hartford, Conn. $6,300,000. Design and development of the J52–P–400 engine. Naval Air Systems Command. N00019–69–C–0299.

—**Marshall Building & Constructing Corp.**, Upper Darby, Pa. $1,896,000. Construction of 100 family housing units at the Naval Base, Philadelphia, Pa. Naval Facilities Engineering Command, N62472–69–B–0016.

—**Burroughs Corp.**, Paoli, Pa. $1,639,144. Classified equipment. Naval Ordnance Systems Command. N00017–69–C–1402.

—**Stanwick Corp.**, Arlington, Va. $1,380,476. Development of maintenance information products for analysis by various naval commands. Naval Ship Systems Command. N00024–69–C–5024.

—**Richard K. W. Tom, Inc.**, Honolulu, Hawaii. $1,088,111. Construction of a nuclear overhaul facility, at the Naval Shipyard, Pearl Harbor, Hawaii. Naval Facilities Engineering Command. N62472–69–C–0320.

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DEPARTMENT OF THE AIR FORCE

3—**AVCO Corp.**, Everett, Mass. $1,000,000. Research and exploratory development on laser technology. Special Weapons Center, Kirtland AFB, N.M. F29601–69–C–0060.

—**Hughes Aircraft**, Culver City, Calif. $1,600,000. Research and exploratory development on laser technology. Special Weapons Center, Kirtland AFB, N.M. F29601–69–C–0058.

4—**General Electric**, Philadelphia, Pa. $4,400,000. Research and development of the MK 12 re-entry system. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. AF04–694–916.

5—**Radiation, Inc.**, Melbourne, Fla. $5,800,000. Development and production of airborne communications equipment. Palm Bay, Fla. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass. F19628–69–C–0159.

6—**United Aircraft**, Hartford, Conn. $1,166,378. Fabrication of forgings applicable to J–57 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. N383–69000A.

—**Kollsman Instrument Corp.**, Elmhurst, N.Y. $1,876,000. Production of altimeters (AAU–19/A). Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0569.

—**Chicago Aerial Industries**, Barrington, Ill. $2,375,000. Production of airborne cameras (LS–42A) for RF–4 and RF–5 aircraft. Ogden Air Materiel Area (AFLC), Hill AFB, Utah. F42600–69–C–1260.

7—**Continental Aviation & Engineering Corp.**, Detroit, Mich. $1,424,520. Production of J–69–T–41 aircraft engines. Toledo, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0229.

—**Thiokol Chemical Corp.**, Brigham City, Utah. $2,189,199. Basic rocket motors and related data applicable to Genie rockets. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–68–A–2831.

—**General Electric**, Utica, N.Y. $2,607,000. Production of airborne countermeasure equipment (AN/ALQ–87 V). Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0821.

10—**Computer Sciences Corp.**, El Segundo, Calif. $4,305,295. Services and supplies for the development, installation, operation, test and maintenance of hardware to improve space track equipment (AN/FPS 79 & 80 of 496L System). Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606–69–C–0503.

—**McConnell Douglas Corp.**, St. Louis, Mo. $2,690,335. Modification of RF–4C aircraft. Robertson, Mo. Ogden Air Materiel (AFLC), Hill AFB, Utah. F34601–68–A–2919.

—**General Electric**, Cincinnati, Ohio. $8,135,656. Production of J79–GE–15 engines for RF–4C aircraft. Evendale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–1232.

—**United Technology Center**, Sunnyvale, Calif. $1,600,000. Launch services and related support for operation and maintenance of Cape Kennedy launch facilities. Cape Kennedy, Fla., and Sunnydale, Calif. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. F04701–69-C–0036.

—**LTV Electro Systems**, Dallas, Tex. $2,000,000. Development of test equipment to simulate missile flights. Garland, Tex. Space & missile Systems Organization. (AFSC), Los Angles, Calif. F04701–69–C–0297.

13—**General Electric**, Cincinnati, Ohio. $8,027,700. Production of J79–GE–10 turbojet engines in support of the F–4J and RA–5C aircraft programs. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0263.

17—**Continental Aviation & Engineering Corp.**, Detroit, Mich. $1,147,410. J69–T–29 engines and related data. Toledo, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0297.

—**Wall Colomonoy Corp.**, San Antonio, Tex. $1,661,821. Repair of jet engine parts. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. F41608–69–D–0623–0003.

—**Pascoe Steel Corp.**, Pomona, Calif. $1,400,260. Production of nylon ballistic closures for aircraft shelters. Hq., Air Force Logistics Command, Wright-Patterson AFB, Ohio. F33600–C–69–0374.

18—**American Electric, Inc.**, La Mirada, Calif. $1,360,200. Production of 750-lb. bomb assemblies. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–69–C–2785.

—**Continental Aviation & Engineering Corp.**, Detroit, Mich. $1,974,024. Production of J69–T–29 aircraft engines. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0362.

—**Contracting Machine Corp.**, Burlington, Mass. $1,668,647. Production of bomb components. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–69–C–2936.

—**Maxson Electronics Corp.**, Great River, N.Y. $3,885,631. Production of components applicable to general purpose bombs. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F34601–68–A–2701.

—**United Aircraft**, Hartford, Conn. $1,087,252. Production of bearings applicable to J57 and TF33 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. N383–69000A – SA–69–1071.

19—**United Aircraft**, West Palm Beach, Fla. $2,000,000. Research and exploratory development work in the field of laser technology. Air Force Special Weapons Center, (AFSC), Kirtland AFB, N.M. F29601–69–C–0069.

—**Page Communications Engineers**, Washington, D.C. $1,742,218. Mobile communications equipment (AN/MRC–113) Long Island City, N.Y. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F03460–69–C–2345.

24—**North American Rockwell Corp.**, Anaheim, Calif. $2,673,100. Minuteman III weapon system spare parts. Ogden Air Material Area. (AFLC), Hill AFB, Utah. F04701–68–C–0174–QP04.

—**Ryan Aeronautical Co.**, San Diego, Calif. $1,284,880. Parachute compartments and components for mid-air retrieval systems. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606–69–A–0175–0001.

25—**Hughes Aircraft**, Culver City, Calif. $1,250,000. Retrofit kits for Falcon air-interceptor missiles. Tucson, Ariz. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–69–C–0941.

—**Thiokol Chemical Corp.**, Brigham City, Utah. $1,111,132. Component assemblies (adapter and loaded case assemblies) for Bomarc missiles. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–69–C–2176.

—**United Aircraft**, Hartford, Conn. $1,138,959. Production of castings applicable to J–57 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. N383–6900A SA–69–1070.

26—**McDonnell Douglas Corp.**, Tulsa, Okla. $1,576,000. Modification kits for RB–66 aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F34601–68–A–3933–RJ05.

—**TRW, Inc.**, Redondo Beach, Calif. $1,101,000. Refurbishment of AN/ASQ–96 airborne electronics equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0912.

27—**General Motors**, Indianapolis, Ind. $3,801,800. Development work on the direct lift aircraft engine program. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. AF33(768)16626 (SA 13).

28—**United Aircraft**, Hartford, Conn. $1,203,536. Production of spare parts for J–57 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. N383–6900A SA–69–1069.

OFF-SHORE PROCUREMENT

6—**Scott Lithgow Drydocks, Ltd.**, Greenock, Scotland. $2,843,500. Overhaul and repair of the floating dry dock, Los Alamos (AFD B–7). Navy Purchasing Office, London, England. N62558–69–C–5015.

—**Canadian Commercial Corp.**, Ottawa, Canada. $1,197,900. Pressure-temperature test sets. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. F41608–69–C–7306.

11—**Canadian Commercial Corp.**, Ottawa, Ontario, Canada. $1,156,095. Modification kits, support spares and data applicable to the URT–26 system—a beacon transmitter for aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Northern Transportation Co., Ltd.**, Edmonton, Alberta, Canada. $1,187,450. Water transportation for the annual resupply of DEWLINE sites along the Arctic Coast. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606–69–C–0479.

Naval Material Command

(Continued from page 7)

Vietnam must be met. Ammunition, spare parts, fuel, overhaul, and training requirements are pressing our support establishment to the limit. At the same time, the normal peacetime emphasis on economy continues in full force: cost reduction, reduction in personnel, curtailment of overtime, stress on competitive buys, set-asides for small business, and many others. Contrast this with our World War II experience, when we simply buried the enemy with our production, and waited until after VE day to count the costs. Operating in the twilight zone presents a challenge that is almost without precedent.

The Naval Material Command works to meet this challenge, along with the normal challenge of providing the Fleet with warfare systems that meet the military needs, yet are fully supportable and economically feasible, through a unified, cohesive management structure and philosophy. The command is huge, and it has many "systems," but it must work as a whole; it must be truly a system of systems.

Launch Complex 30 at Cape Goes to Navy

Launch Complex 30 at Cape Kennedy Space Center, Fla., has been turned over to the Navy's Underwater Weapons Research and Engineering Station, Newport, R.I.

The Navy will convert the former Pershing missile test firing site to a facility to be used in evaluating its new MK 48 torpedo weapon system.

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Ramey AFB Site of New SOFNET Solar Observatory

The Air Force has taken another stride forward in keeping a scientific eye on the sun with the opening of a new solar observatory in the Caribbean. The new telescope is located at Ramey AFB, Puerto Rico, and is the latest addition to the Air Force Solar Observing and Forecasting Network (SOFNET). Installation was managed by the Air Force Systems Command's Electronic Systems Division.

SOFNET observatories are located at key points around the world to monitor the solar activity and gather forecast information for predicting geophysical effects. Network locations include Greece, Hawaii, the Philippines, Puerto Rico, and U.S. sites in New Mexico, California and Massachusetts.

Information from the Ramey observatory and other sites is funneled into the Solar Forecast Center, at the North American Air Defense Command's Cheyenne Mountain Complex in Colorado.

The telescope system permits simultaneous observation, remote television monitoring, and photographic recording by an electrically programmed camera to permanently document solar phenomena. At sunrise its celestial coordinates are set by a station operator and the system's sun-follower is activated. The system does the rest. Tracking and photography are automatic.

Accurate predictions of solar-flare eruptions, by Air Weather Service observers and forecasters, have important bearing on improvement of sky-wave radio communications as well as manned spaceflight programs.

Violent solar explosions emit great amounts of X-rays and high-energy atomic particles. Increased radiation from a solar flare can black out pilot-to-ground communications, disrupt long-distance high-frequency radio communication, change low altitude satellite orbits, and produce dangerous radiation levels for unprotected astronauts in space. Such events can wipe out long distance communications for more than an hour. It is these operational problems the Air Force is working to solve.

Army Seeks Ideas for Future Missiles

The Army Missile Command, Redstone Arsenal, Ala., has issued requests for quotations asking industry to take an early look at its requirements for future missiles, and submit worthwhile ideas on four systems problems.

The four future systems are: a tank type device with emphasis on firepower; a completely new weapon system to replace the present light anti-tank assault weapon; an anti-tank assault air defense weapon which could be suitably effective in either an anti-tank or air defense role; and a new generation of artillery type missiles to be fired from Army aircraft.

By making qualified contractors aware of the Army's problems and asking them how they would describe new and unique ideas to solve the problems at the beginning of a research effort, substantial time saving is anticipated during the later development phases.

Technical supervision of the research and development effort is the responsibility of the Future Missile Systems Division of the Missile Command's Research and Engineering Directorate.

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